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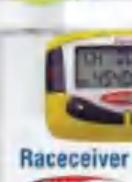
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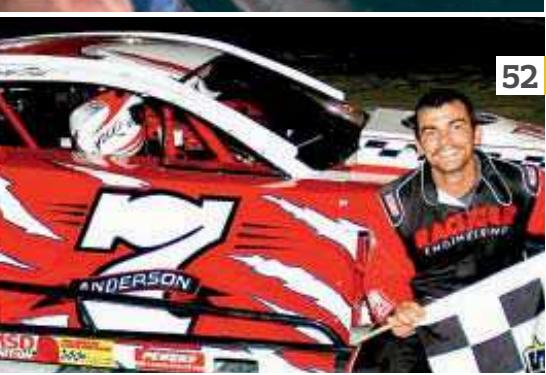
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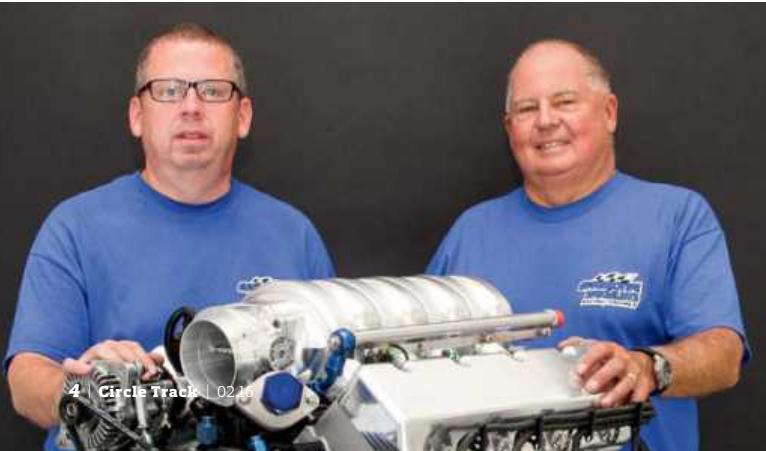


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Keith Dorton and Automotive Specialists are celebrating 50 years in the engine-building business. These photos provided by Jim McFarland provide just a sample of the great successes this trailblazing engine builder has enjoyed.



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TURN FIVE

BY ROB FISHER

A Crate Champion

CIRCLE TRACK'S VENERABLE 604 PROJECT CRATE ENGINE HELPS A RISING STAR NAB A TITLE

Several years ago, Circle Track embarked on building a race car with our resident project car driver, Dalton Zehr. The theory was to take a hard look at crate motor racing and determine how one could legally improve the performance of these cars by focusing on non-engine items. We played around with transmissions, rear ends, fuel cell placement, and more.

While the car was being built, we yanked the Chevrolet Performance 604 crate motor out of its ... well ... crate and proceeded to turn it into a flogging mule to test new parts, rebuilt carbs, and things of the sort. Once the car was together and ready for testing, roughly a year later, we sent the motor off to Wegner Automotive to be certified so that Dalton could drop it into the car and legally race it in the TUNDRA Series. Around April of this year Wegner gave the motor his blessing and Dalton and his team got to work. Early testing of the car proved that all of the off-season work was going to pay off with a pretty racey car.



The six-round TUNDRA Series travels to marque tracks in the state of Wisconsin, like Dells Raceway Park, Golden Sands Speedway, and Jefferson Speedway, which is where this story concludes. Entering the final race of the season at Jefferson, Ty Majeski had a 25-point lead over Zehr. But as the checkered flag fell, it was Zehr standing in victory lane with not only the race win but his second consecutive TUNDRA Series title. He beat Majeski by a mere 5 points. Wedged between the framerails of his racer was our venerable 604 crate motor.

Now there are plenty of Champions who are getting crowned around this time of year and each one of them deserve recognition and props for the hard work they put in to achieve the success that they did. My reasoning behind sharing Dalton's story is a little bit self-serving ... well ... magazine serving is really the better description. We here at *Circle Track* spend a lot of time working to build meaningful stories for you to read either every month in print or every day online. We get our hands dirty in the shop working on race cars and engines. But we can't do any of it without the likes of our partner teams, be they engine builders like Keith Dorton or racers like Dalton Zehr. So when one of them has some success, especially with parts we had our hands on, you can bet we are going to thump our chests a little bit.

Speaking of Keith Dorton, I wonder how many of you knew that 2015 is Keith's 50th year in business. Well, we decided to turn his old friend Jim McFarland loose on a much-expanded version of Enginology for this month. It's a fascinating walk through the past, present, and future of Keith's company, Automotive Specialists.

Finally, don't miss our Annual Oval Track Parts Guide in this issue. The Guide boasts over 300, yes 300, listings of manufacturers who build, make, or sell parts for our sport.

Enjoy it. We'll see you at PRI, and remember, go fast and turn left! ☐



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OFF THE MIC

BY MATT PANURE

Blame it on the Rain

WHEN MOTHER NATURE WANTS TO WIN, SHE WINS

In one of my first articles I said I'd let you know a little more about me before we got into the tough stuff. I guess we can consider this one the transition piece—one more tidbit of information, then let's get chatting. Shall we?

Believe it or not my first major of choice in college was Environmental Science. Here is the question I got (and still get when I let people know that I have a bachelor's degree in the field), "How does someone who loves racing get into that?" Well, to be honest, racing played a big part in it ... I always wanted to be a meteorologist, and this particular major at my small school was as close as I could get. However, I then realized how much more I would have to do to get into the field. More math, more physics, more numbers. No thanks.

Meteorology always fascinated me, especially the excitement of the severe weather spurts we get in the Midwest. It was also fun to try to predict the weather patterns and the potential threats on race day. In my earlier days hanging around the track, I wanted to be one of those guys who helped make the decision to run or cancel. Heck, I wanted to be the guy who made the decision. Flash forward to today. I don't want to be that guy. When it comes to rainy race days, no one wins ... no one even comes close.

It may be the offseason, but it's always a good time to try to bridge the gap between promoters, racers, and fans. Next time these scenarios come up, my hope is that this information will help you understand why your promoter is doing what he or she is doing.

Part of the trigger for this subject is the fact that our Great American Racing Series event at Plymouth had to be called due to weather. We pulled the plug the day before to save some miles for the travelers. On that same night I sat in a scoring tower watching it rain while the radar was completely green all over the state of Wisconsin. We waited until 6:30 to cancel the 7:00 show. Which method was better? Neither. Damned if you do, damned if you don't.

Let's look at the first scenario: The promoter who cancels (or postpones) an event early. Why do they do it? In most cases this promoter is trying to help his racers,

especially if they have to travel. This promoter may also be banking on fans traveling from a distance. If it's a dreary day with rain showers around, chances are those fans won't travel, and if they do, the last thing the promoter wants to do is turn them around right when they get to the gates. This promoter needs to craft his message carefully, or the social media wolves will be ready to attack. They'll pounce if the sun starts shining around 5 p.m.

I saw a case of this once this past summer. Every other track in the area rained out, it rained at the track all day, and then cleared up around 5:30. Events don't get uncanceled. This promoter had to take his lumps, but this was an event fans would travel to. If they were an hour away, and it was raining at 5, would they take the trip to the track? Tough sell here.

Now, the second scenario: The promoter who opens the gates and fights Mother Nature. To the diehard racers and fans this promoter is a hero. He is one who silences the social media wolves (for a little while anyway). As a kid, I loved this promoter and his willingness to fight. Unfortunately, the night usually ends one of two ways for our gallant weather warrior. Either the precipitation wins and the promoter must cancel, or the promoter wins the weather battle, but takes a large hit at the front gate. Remember what I said? No winning here.

Contrary to the belief of some, very few promoters are happy to cancel an event. The promoters who cancel quickly are usually the ones accused of this on social media. For most promoters, racing is their business and they only get so many opportunities to make money during the year. Don't forget, they've already spent money they won't get back (advertising, insurance, some paid help). The battling promoter also may end up having to make payoff with a diminished front gate.

On some occasions, yes, a promoter has to cut his losses. That doesn't mean the promoter is happy about closing your playground for the night. He wants to entertain you, but he needs to watch his bottom line to make sure he can keep your track open. Unfortunately, the days of the promoter gambling on a crowd to show up when the weather is awful is long gone. Too many promoters have rolled the dice and lost, and just don't want (or can't afford) to take the risk again.

The next time the weather is dreary and it's possible an event might cancel, remember, your race promoter is staring at radar, pacing back and forth, and trying to make the right decision. My guess is that he doesn't want to cancel, and wants to see your smiling face at the track. Help him out by supporting (or at least trying to understand) the decision, and getting back to the track the next time the gates are open.

Thanks for reading. Have a thought on this? Shoot me an email or find me on Twitter @MattPanure. Until next time, my friends, stay out of trouble! 

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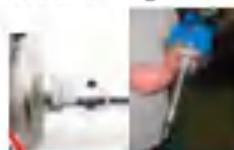
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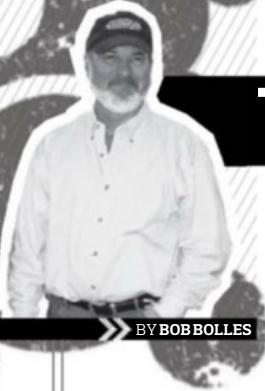
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TRACK TECH Q&A

BY BOB BOLLES

Get a GRIP on Knowledge

LEARNING HOW TO LEARN IN RACING

and other projects kept stealing our attention away. Then, as my previous article explained, I became aware of the GRIP seminar put on by partners Jason Enders and Gary Crooks.

I was invited to the 2015 edition last February and was taken by the extent of real-world knowledge that was presented. I quickly concluded that we could do no better than this. I entered into discussion with Jason and Gary and they expressed interest in having *CT* be a sponsor and promoter of the seminar for 2016.

I know a little about seminars. When I started my career, I attended as many seminars as I could, read up on all of the books and other material I could get my hands on, and tried to soak up as much knowledge as I could as fast as I could. It was many years until I felt I had enough learning and experience to be qualified to be called a consultant.

Then, I started giving my own seminars and hiring out to teams to educate them as to what I had learned. I made a few discoveries on my own during those early years, but truthfully, 99 percent of what I knew then, and certainly what I know now, came from what I read in books and magazines, heard spoken by other engineers and racers, and learned at seminars I had attended.

So, I value the distribution of knowledge. The GRIP seminar that *CT* has endorsed and promoted that takes place in early February of 2016 is a continuation of what I have lived my professional life about, teaching other racers what I have learned. I want to spread the good news, so to speak.

There is a famous quote that goes "You can get everything you want in life if you will just help enough other people get what they want."

We finally got what we wanted.

Some time ago, *CT* General Manager and Editor-In-Chief Rob Fisher and I discussed the possibility of developing a seminar series. Since then we have kept our eye out for opportunities along those lines

It is by Zig Ziglar and it is a principle I have tried to apply to everything I do. It is what Jason and Gary are all about too.

How do I know that? It is because they do not allow any promotion of companies or products at the GRIP seminar. Oh sure, you'll see the presidents and founders of some of the most successful racing businesses in America there, but they talk about technology, not their products; it's a strict rule.

A big question racers ask about the cost of knowledge is this: "Will it be worth the money spent?" I have actually had racers ask if buying my book is worth it. I tell them, buy all of the books, heck, they're only around \$20 each and the total for all of the good ones add up to around \$100 or so. And the increase in knowledge from reading those books far exceeds the cost. It's a no-brainer.

Is a seminar really worth the money? Let's put it in perspective. I have been to lots of track test sessions with lots of serious race teams. First off, the hard costs of a test are the tires (two sets at \$620 a set = \$1,240) plus fuel (10 gallons at \$10 per gallon = \$100) plus the travel expenses add up to close to \$2,000 for a one-day test.

At most of the tests I have attended, the

What will definitely increase your knowledge base ... is learning from outside sources. You cannot teach each other what you don't already know.

teams usually don't have a good plan for what they want to accomplish. So, they change a multitude of things in no particular order and either get better or worse, which can be a learning experience either way. But no significant knowledge comes out of most every test.

The level of racing knowledge remains the same after the test as before. What will definitely increase your knowledge base, and help provide a workable plan for the next test, is learning from outside sources. You cannot teach each other what you don't already know.

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TRACK TECH Q&A



BY BOB BOLLES

So there is no way to compare learning from a test versus learning from books, magazines, or seminars. We must venture out into the world in order to learn new things. And it cost money for people to put on seminars, publish books, and print magazines. Nothing comes free. But if you are searching for quality information about racing technology, you can do no better with your money than buying publications and going to seminars.

I will be presenting at this year's GRIP seminar and I hope to see many of you there. I get a kick out of teaching racing tech, and I usually come away with more information than I went there with. You'd be surprised how much is shared by the attendees in the discussions, and all who are present benefit from that exchange. We'll all come away just a little smarter.

If you have comments or questions about this or anything racing related, send them to my email address: bob.bolles@sorc.com, or mail can be sent to *Circle Track*, Senior Tech Editor, 1821 E. Dyer Rd. Santa Ana, CA 92705.

Racing is Fun Comments

Hi Bob,

I was sitting here in a Charlotte hospital after having knee surgery reading your editorial on "Racing Fun" and couldn't agree more. I raced for over 25 years and it was for the most part just like you said.

features in the Top 10. By the third year we were winning races, and WOW that was fun! Keep up the great work,

—**Roy Ethier, Newton, NC**

Roy,

Thanks for sharing that. Racing is not unlike any other endeavor we undertake, we get out of it what we put into it. That's not to say racers don't work hard, they do. But we all need to work smart and we try to share what we have learned here at CT to help racers race smarter. Your story is proof of that concept and it is a lot of fun to succeed, especially when you think back and know you worked hard and smart to get there.

Driveshaft Angles

Bob,

We have been putting extra effort in to make sure the rear end is square, tailshaft is in alignment (straight) with the pinion, tire contact patches are inline, and so on, but considerable discussion has centered around the angles of the pinion shaft and the tailshaft of the transmission being "equal and opposite."

Does that mean if the pinion shaft is down 2 degrees, that the tailshaft of the transmission must be up 2 degrees; or if one is down 2 degrees, the other should be down the same amount? We have two Super Late Models we

run in Michigan and Wisconsin. Any comment would be deeply appreciated.

Thanks,

—**Dave**

Dave,

Your questions are timely. I just went through this with a northeast Modified team running on dirt. In their case, the tranny shaft was running downhill to the rear at 6 degrees and the pinion was down to the front about 4 degrees.

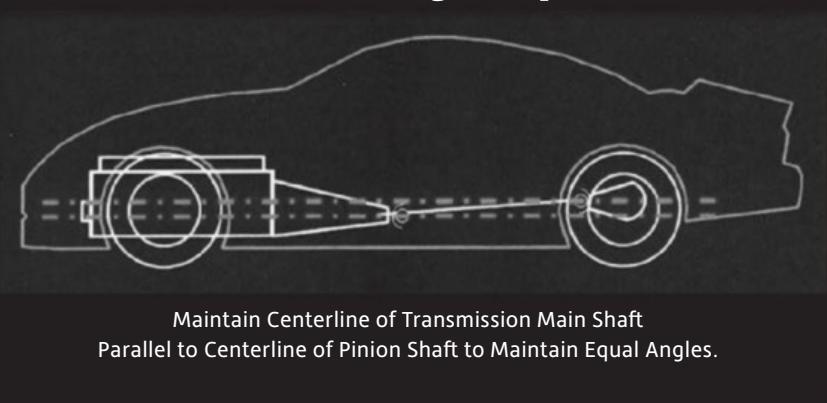
This driver asked me what he should do to make the alignment better. So, I suggested that he reduce the tranny angle and make the pinion equal and opposite to

the driveshaft. This meant he had to run the pinion uphill to the front to accomplish having what the driveshaft experts say is critical alignment.

He did that and the results were very noticeable. A vibration or harmonic that he had felt ever since he had the car was now gone. The car had much better bite off the corners and he has won several races with the car since making the changes.

What the experts say is that when you have equal and the same angles, as the engine turns at a constant rpm, the pinion will accelerate and decelerate twice per revolution,

Driveline Angle Setup



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Parallel to Centerline of Pinion Shaft to Maintain Equal Angles.

When we started in the late '80s the car counts were through the roof and they were sending 10-15 cars home so you had to be on your game. Just like you said we thought for sure the fast boys were cheating, but then after buying a car built from one of the best chassis builders all the pieces started coming together.

This builder showed us the way to properly set up a car and how important it was to keep checking it every week. Before you knew it we weren't the car going home. The following year we were in the hunt and qualifying, through heat races, with the fast boys every week, and finishing most



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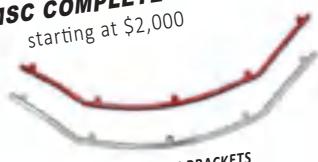


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TRACK TECH Q&A



BY BOB BOLLES

speeding up and slowing down. In the race car, this would be like pushing and letting off the throttle multiple times while you are accelerating.

This cannot be good for bite, especially on dirt where grip is at a minimum. In order for the rear tires to rotate smoothly and at the same rpm through the entire rotation, the tranny and pinion must be equal and opposite angles to the driveshaft. And the actual angle does not need to be more than 2 or 3 degrees.

1969 Chevelle Setup

Bob,

I'm building a '69 Chevelle street stock for Sandusky Speedway, a half-mile asphalt track. Our minimum weight is 3,400 pounds and we must run a stock sway bar. My question is, what is a good starting point for front and rear spring rates?

—Dave Barnes

Dave,

I would love to be able to tell you what springs to run, but no one can do that without knowing a lot more about the car. The concept of total package means that we must make all of the systems on the car work together.

Just looking at the spring rates is not going to help you. You need to decide what works with your rear suspension, a leaf spring for this car I believe, versus what works for a metric four-link. The two suspensions are vastly different and require much different spring rates.

The leaf spring rear suspensions have a very wide spring base and as such, require less overall spring rate than other types of rear suspension. These cars tend to be better on tight, high-banked tracks once you get the right springs in the car.

What many times determines what rear spring rates you use, depends on how the front suspension is set up. You must consider your front end design, including front Moment Center location, bumpsteer, and Ackermann. Any of these that are not right can upset the entire setup and make choosing spring rates very confusing.

Piston Clearance Correction

Bob,

If you measure a block bore at 4.030 inch and the piston diameter at 4.028 inch, the clearance is 0.002 inch not 0.001 inch that you wrote in the Dec. '14 Circle Track engine rebuild. Piston clearance is measured on one side of the piston, not both sides like you stated.

To subtract piston from bore and divide by 2, I don't think so. The old-school way to measure piston to bore clearance is to use a half-wide feeler gauge placed between the piston and bore tight enough to require about 8 pounds of pull to move it. This still works with uncoated pistons.

—Bruce

Bruce,

Thanks for pointing that out. The accepted definition of piston clearance is the difference between the bore diameter and the piston diameter. If you want to think about a centered piston and what the gap would be on both sides, you could divide the clearance by 2.

So, for a piston clearance of 0.003 inch, the side clearance would be 0.0015 inch. Some old-school guys will use two feeler gauges set on each side of the piston. In this case, each would be fifteen-thousandths to get the thirty-thousandths clearance.

Most engine builders do not recommend using feeler gauges to measure the piston clearance. You can use bore gauges and micrometers to measure for piston clearance and get a much more accurate answer.

Evening the Field

Hi Bob,

I am an off and on Street Stock racer with not much experience. My concern is having fun. So I am most interested in the articles about crate engines, i.e. evening the field. I sometimes think that too many rules can make it more complicated.

How much time and money is spent by the drivers and tech persons to police things? I see a broad range of rules in Street Stock, ranging from requiring entirely stock parts to allowing aftermarket springs and suspension parts as well as crate engines.

What do you think about using tire rules, limiting intake/carb, and exhaust rules alone to even the field? Are smaller tires enough to make even the most extreme suspension modifications irrelevant? Could smaller carbs, intakes, and exhaust manifolds likewise make extreme engine modifications useless?

—L.C.

L.C.,

Many sanctions and tracks now use weight and other differences to even the competition between teams that use different engine packages of varying power. Yes, it does work to an extent.

As I have pointed out, the use of smaller tires limits the advantages of more powerful engines, but nothing can limit the advantages of good suspension design and setup. That is the area where a team can excel and not need to spend lots of money on high-horsepower engines.

Evening the field is a complicated and unfair thing in reality. Say a team does their homework and the suspension is just the way it is supposed to be and the setup is balanced to where they are using the four tires to maximum advantage, should they be penalized for being faster than the rest of the field?

If we can limit our "evening the field" to power and leave the setup improvements alone, then I am all for bringing the field closer to even. The goal in racing has always been to find the right setup that is fast and stays fast and having a driver who can use that performance to win races. That should never be legislated out of the sport. ☒



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A Racer's Reminder

This post was found on Facebook. It was written by Don Wickstrum, who races and owns race cars at Madison (Wisconsin) International Speedway. We at *Circle Track* thought it was a good piece from a racer's perspective on the promoter/racer relationship. Thanks to Don for letting us run it.

Dear Racers and Car Owners:

First off this is not pointed at any persons or teams, but all of us as a racing community. What I say I say in love. I want to remind all of us of a few things.

1. You are not track owners, and no different than being an armchair quarterback; you don't have a clue (nor do I) what it takes to own a track. There is a good reason why more tracks are shutting down than staying open, because it's tough, it consumes you, and you have to put up with social media, and drivers/ team owners with short memories. Without the (promoters) of the short track world that keep tracks open, you wouldn't be able to race.



Racing is supposed to be fun. I look at some of the teams around us sometimes and think to myself, "**I would walk away before I became that miserable.**"

2. No track owner signs up to make sure you have a bad night, or wishes for accidents. No track owner hopes that you don't come back. However, I do know that they hope (just as they try to work with you as you go through your car being light, or off a measurement) they would like the same in return, for you to work with them when they make a mistake.

3. Last I knew when I signed up as not only a car owner but a racer I did not see any guarantees at all. There was no guarantee I would not have a car that was in an accident, no guarantee that a car would not blow a motor, there was no guarantee I would not race against slower, less experienced drivers (yeah all of us have been one of these at one time or another), there was no guarantee that the track would ensure I would be 100 percent safe, in fact those of you who are honest with your life insurance company will find out that when you are a racer the cost goes up! Why? It's dangerous ... period.

There also is no guarantee that people won't be people and not make a mistake. We are in a sport that has many different talent levels and many different experiences, being human is part of the risk.

4. When you pull onto your local track's pit area, you are agreeing to all the rules, conditions, and environment of the track. This means when you get teched, you are subject to the findings, stop whining, stop complaining. A good race team knows the rules, however, your ignorance, attempts at cheating, and/or risk taking are not the track's

fault, but yours. Suck it up, and take it when you aren't in line. When you act out, complain, argue, or whine others take notice (and for some of you I know it's been the reason some don't have sponsors).

5. Racing is supposed to be fun. I look at some of the teams around us sometimes and think to myself, "I would walk away before I became that miserable." There are over 330 million people in the U.S., and those who race are a very small percentage that are blessed enough to be able to race!

6. Be thankful. I have been in wrecks, my cars have been, I've had to spend the time and money, and it sucks. However, all my drivers and crew have walked away safe! Cars are replaceable, people aren't.

7. Walk a mile in someone else's shoes. Thank your local short track owner/ promoter for keeping your track open. If you see a need, fill it. If they are short on safety crew, volunteer. If the Porta Potty needs toilet paper, fill it. If the team next to you needs a distributor, loan it. Feel the joy from being thankful.

In closing, stop using social media to put down your local track. Instead help promote them. I promise you, if they all close up, your social media will be nowhere as fun as racing, but unfortunately it could well be all you have in the near future.

—Don Wickstrum

Fluidampr

We would like to apologize to our friends at Fluidampr. Their product was used in our G.A.R.S. engine build, but their company was not given the proper credit. We are very appreciative of their support and extremely pleased to have their product in our G.A.R.S. engine. Take a look at our Quick Tech this month to learn more about them.

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The MSD Timing Pro Timing Light is designed for the racer or professional who needs a timing light that is tough, easy to use, and extremely accurate. It is constructed with a solid-state circuitry and uses a Silicon Controlled Rectifier (SCR) that provides stability and accuracy in measurements up to 8,000 rpm. A rugged, yet lightweight injection molded design allows the timing light to be used in rough environments from the pits to the shop. It produces an intense strobe that is visible in daylight and features color-coded and insulated battery clamps, which provide a strong grip to terminals with a tight and safe connection. For more information visit www.msdsperformance.com.



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For dirt and asphalt Sportsman racers PAC presents bumpstop springs. The springs come in a 1- and 2-inch series. There is no hysteresis like urethane bumpstops, which makes the bumpstop springs more consistent with temperature variations. The bumpstops are lightweight at just 0.5-pound each. Full retainer cups and stacker hardware are available as an add-on to help maximize performance. Bump spring retainers are available (two are required) with a 1.90-inch outer diameter, 1.705 inner diameter, and a 0.4-inch height, with a 0.63 through hole. The retainers weigh just 0.10 pound each. For more information visit www.resuspension.com.



Keep the Fuel Cool

Exposure to heat and direct sunlight can cause damage to any fuel supply, shortening its life and degrading performance potential. In some pit and paddock situations it's unavoidable to keep fuel out of the sun. Design Engineering Incorporated (DEI) provides a solution to protect fuel supplies from exposure to sunlight and extra heat with their reflective fuel can covers. The reflective covers are specially designed for easy coverage and removal. They also feature a sewn-in pull handle, which easily helps with that. Made in the USA and recommended by race fuel manufacturers the covers come in three styles: can cover for 5-gallon metal fuel can, jug cover for 5-gallon square fuel can, and fuel drum cover for a 54-gallon metal fuel drum. For more information visit www.designengineering.com.



Suit Up!

Getting ready for next season? Is it time for a new race suit? Alpinestars features the GP Start Suit, a comfortable, close-fitting suit that incorporates safety measures and some of the most innovative materials. The Start Suit is safety certified to FIA and SFI homologation standards. Its lightweight design can be anatomically optimized for the perfect fit. The suit features a 100 percent Aramidic outer layer to provide resistance from heat and an Aramidic inner lining for maximum heat transfer protection. For the sake of comfort the suit features anatomical arm, leg, and torso paneling, internal flat seams to reduce pressure points, adjustable collar and elasticized waist, and ribbed, stretchable wrist cuff and boot leg cuff. For more information visit www.alpinestars.com. ■

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RACING AROUND



1 QA1 HIRES CHUCK OLSON AS DIRECTOR OF ENGINEERING

LAKEVILLE, MN—QA1 HAS announced that Chuck Olson has been hired as Director of Engineering. Olson will lead the design and manufacturing engineers as well as new product and development, bringing 22 years of experience in contract manufacturing and the product design field with him. Olson also races a WISSOTA Modified with his father and uncle during the summer, and has been active in dirt circle track racing for the past 25 years. For more information visit www.qa1.net.

2 SUPER DIRT WEEK SAYS FAREWELL TO THE MOODY MILE

SYRACUSE, NY—DIRTCAR RACING has announced that the 44th running of the NAPA Super DIRT Week will be the “Finale at the Fairgrounds” in Syracuse before moving to Central New York Raceway Park in 2016. The Finale at the Fairgrounds will take place October 7-11, 2015. The state of New York has announced that they will remove the grandstands and mile-oval track as a part of the New York State Fairgrounds renovations. DIRTcar officials and

REGIONAL NEWS, INDUSTRY UPDATES & ITEMS OF INTEREST FROM AROUND THE COUNTRY

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2 Governor Cuomo's office have made an agreement to keep Super DIRT Week in Central New York for the next 10 years.

Switching venues will mean leaving the more than 100 years of racing history the New York State Fairgrounds has in the books. Buzzie Reutimann won the first two NAPA Super DIRT Week crowns in 1972 and 1973, but Brett Hearn holds the record for most victories with six Syracuse 200 wins. The Moody Mile is one of three mile dirt ovals left in the country.

For more information visit www.superdirtcarseries.com.

3 THUNDERBIRD RACEWAY SET TO REOPEN IN 2016

DALTON TOWNSHIP, MI—THUNDERBIRD Raceway is scheduled to reopen in May 2016. Tim Sprague purchased the track and is doing the much-needed renovations to reopen the third-mile dirt oval next year. The dirt oval was built by a shoe salesman named Wink Bleich who was inspired from watching races at another racetrack. Thunderbird Speedway first opened in 1958 under the name Birchwood Speedway. The track switched owners over the 52-year history and eventually closed for good in 2008.

The racing surface is in good condition, but the buildings and electrical work all need to be updated. Sprague will also have to include storm drainage, parking, and a number of code requirements, like curfew and noise rules. For more information visit www.thunderbirdraceway.net.

ASCS WILL NOT ALLOW ALUMINUM BLOCKS FOR 2016

THE AMERICAN SPRINT Car Series (ASCS) has decided not to implement an aluminum block option for the 2016 season. ASCS made the decision to put the option on hold after meetings with directors, promoters, car owners, and drivers revealed concerns of the new aluminum block option

adding to the already-high cost of the sport. At this time no other changes have been proposed to the current ASCS engine program. For more information visit national.ascsracing.com.

4 MADERA SPEEDWAY TO ADD JR. LATE MODEL DIVISION

MADERA, CA—MADERA SPEEDWAY has announced that for the 2016 racing season they will offer a new division for young drivers. The Jr. Late Model division is specially designed for kids 10-16 years old, and offers young drivers a chance to develop their skills in full-bodied race cars. All drivers must have previous racing experience and present a racing résumé in order to be eligible to compete. The driver's parents or legal guardian must also sign the minor's release paperwork. The series will have eight 50-lap races, each race being divided into two 25-lap segments, with possible TV coverage.

The Jr. Late Model division will model after the LoanMart Open Late Model rules allowing young drivers to use economical cars with steel shocks, a Hoosier 970 treaded tire, and 602 or 604 crate motors. A restrictor plate and rpm rule will be in effect to limit the performance of the cars. For more information or rules for the Jr. Late Model Series, visit www.racemadera.com/JrLateModels.html.

5 AXALTA COATING SYSTEMS TO OPEN CUSTOMER EXPERIENCE CENTER IN NORTH CAROLINA

CONCORD, NC—AXALTA COATING Systems has announced that they will open a Customer Experience Center in Concord, North Carolina. The 45,000-square-foot facility will serve Axalta's refinish, light vehicle OEM, and industrial customers. The Customer Experience Center will also provide training for refinish technicians and house meeting and conference rooms. The Hendrick Motorsports campus will house Axalta's new facility. Axalta has sponsored Hendrick's Racing Team for 23 years.

Axalta's new Customer Experience Center will open late 2016 and is expected to draw hundreds of customers a year. For information visit www.axaltacs.com. 

ULTIMATE RACING



Automotive Specialists... 50 Years and Counting

FROM HUMBLE BEGINNINGS, AN INSTITUTION HAS EVOLVED OVER THE PAST FIVE DECADES

TEXT BY JIM MCFARLAND
PHOTOGRAPHY COURTESY OF KEITH DORTON

Author's note: No less than Smokey Yunick once praised Keith Dorton on how he had built and sustained a successful engine-building business for longer than anyone he knew. Could there be a more substantial compliment? In the pages that follow, you will learn why Smokey made the comment. We'll let Keith give you the reasons.



In 1997 Automotive Specialists moved into their present location, seen here.

In the Beginning

"I'd been working at Holman-Moody and really liked my job. But in 1965, I hadn't been considering going into business for myself, especially since I'd just gotten married. Even so, Mr. Holman issued some ultimatums that I didn't agree with. And since I already had a little shop I could work out of, moving on seemed like the thing to do. Actually, the place was a little two-bay garage out behind a service station, so I just decided to go for it."

Now, 50 years hence, Automotive Specialists has grown into a widely recognized and respected source for engines that encompass a wide range of applications, including drag racing, boats, a variety of circle track versions, and even Bonneville land speed vehicles.

"I really didn't know what to expect, but at that young age whatever was going to happen wouldn't have bothered me, anyway. At that point, I took any business that was available, from a brake job to a tune-up to working on a race engine. It didn't matter, just so I had some work to do. The first piece of equipment I bought was a Stewart-Warner engine-balancing machine. One of my jobs at Holman-Moody was balancing engines, so I'd had ample experience doing this type of work. That led me to my first paying racer in the person of Ralph Earnhardt, Dale's father."

How did he find you?

"Well, when I was a little younger, I'd go up to his shop and hang out until he'd run me off. He didn't live that far from me and the result was we'd become pretty good friends. So when I got my balancing equipment, he became a customer because at the time the nearest place you could get a crankshaft balanced was in Winston-Salem. I remember that his advice was to stay in the little two-bay garage, don't hire anybody to help you right now and stay focused on balancing crankshafts. He actually built a few



In 1966 Keith Dorton developed and manufactured combination headers and intakes for inline six-cylinder Ford and Chevy engines. These header/intakes were primarily used in oval track racing.



Here you can see the header/intake combination in place on a motor.

Ben Hess won the 1989 ARCA Permatex 200 with power from Automotive Specialists.



In the early '90s Automotive Specialists' intake work was sought after at the highest levels of American motorsports. In 1990, Keith's company supplied 20-plus NASCAR Winston Cup cars' intakes for the Daytona 500, including winner Derrick Cope.

race engines for other racers, too. So he encouraged me to just balance engines, that I'd make a good living and there would be a minimum of pressure on me. At the time, I thought that sounded awfully boring. Whether fortunately or unfortunately, I didn't listen to him because for 50 years now, whenever I could, I've invested in buying more and more equipment or more inventory to grow the business.

My view was that you either pack it up or go forward, and I've always chosen the latter."

Were you able to reach out to other potential customers in the NASCAR community?

"Well, during my Holman-Moody days, I'd gotten to know a number of people who were involved with what NASCAR was then calling the Grand National series. Once I began to add

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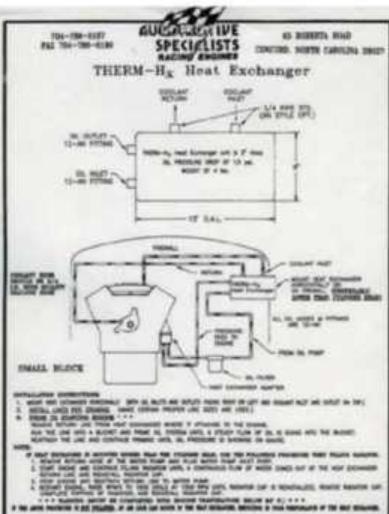
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Keith Dorton's testing has shown a heat exchanger at 1000 RPM and has about a 30 degree drop over the heat exchanger. This unit is a combination of a mechanical process and chemical process to a minimum 1.5% aluminum loss.

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Always one to work on any area of the motor, Keith focused some of his efforts on working with Dunham-Bush/Fluidyne in 1992 on developing and testing water/oil heat exchangers for endurance racing. For efficiency and safety they had to hide them in NASCAR stock cars to do testing. This idea led to combination radiator/oil coolers.



Keith Dorton's restrictor plate intake manifold was something of legend in the '90s and beyond. This cutaway shows some of the genius behind it.



more equipment this became a pretty sizeable chunk of our business. We were also into drag racing at the time, and being located where we were, our successes in both these venues of racing began to bring in more business. You know, if you do well at the track on the weekend, there'll be people calling or knocking on your door on Monday."

So being small and family owned was working for you?

"Yes, and I'd say overall that we stayed pretty small for a time, although I did manage to hire a couple of guys to help out. Couldn't pay them

very much but they were valuable to our early growth. Actually, my dad had given me \$100 to open a bank account and having just gotten married and buying a house, there weren't many assets from which to draw for growing a business. But given the early successes, we had made it easier to sell our engine-building services.

"Over the years, we've kept this a family owned and family run business. Of course, most of the businesses in our area at the time were in the textile field. I mean there were cotton fields everywhere and family owned businesses were the industry around here.

Our business was clearly different. Back then, if you're a 20-year-old kid and you go to the bank for a loan to buy race engine building equipment, you get some pretty strange looks. But somehow or another I got to know the president of the larger of our community banks, and when I'd go for a loan he never said no. And you know, things like that you never forget.

"Even the advice that Ralph had given me, although I didn't follow it, was appreciated. The fact that he even showed an interest in what we were doing was meaningful and not forgotten. And, you know, sometimes you don't realize the importance of things like that until years later when you see how fortune could have taken you in another direction that might have led to less success or problems in general."

From this humble beginning, Automotive Specialists moved into an "old rock building" that was constructed in the early 1900s. It was here and shortly after this move that Keith began to really specialize in his cylinder head business.

"At one time, we had seven, full-time cylinder head porters and, of course, this was when everything was done by hand. Today's CNC porting techniques hadn't even been considered, much less practiced. Furthermore, back then, everything was in cast iron and grinding on it was dirty and noisy. We wound up doing a lot of cylinder heads for several higher levels of racing. I was really glad when we started working with aluminum heads, and we could get away from cast-iron welding and heating ovens and all the difficult techniques these heads required, especially because we were raising exhaust ports and making other changes. Things have certainly changed, and in a good way, in that respect."

As the company evolved

It appears you've always maintained a measure of control over your number of employees. What's the largest staff you've had over the years?

"I guess the largest number of employees we've had was 15, during the '80s and '90s. We scaled back because while I won't say it was like

a production line environment but more of a feeling that my involvement wasn't what it should be. This may seem a bit strange because we then moved out of that 7,500-square-foot building into the one we built 16 years ago that's 15,000 square feet and scaled back to about half the number of employees. Actually, this improved level of efficiency was largely due to new equipment technology improvements because we were able to produce the same number of engines with half the staff. We moved to a 7,500-square-foot building in 1979. Then the location we are now in 1998."

Although you were located, even from the beginning, in a part of the country where circle track racing abounded, you previously mentioned some involvement in drag racing engine building as well.

"Truth be known, we were doing machine work for OEM-backed drag race teams like Sox & Martin, as well as local drag racers participating at a much lower level. In fact, with respect to the Sox & Martin team, we worked directly with Jake King, their engine builder. We also did some headers and intake manifolds for those guys as well. What some people might not know, at least during our earlier days, was that we had a pretty good piece of business in the marine industry. We built race engines, as an example for SK-type boats. These were typically pump-gas, carbureted engines that were very similar to the ones we built for the NASCAR guys."

"In fact, I about lost my life during testing of an SK race boat, about 40 years ago. I was riding with the driver and at about 110 mph, the boat had a malfunction and just came apart. The Lord was with us because we both lived to tell about the experience. That was my last fast ride on water. Maybe I'll go fast on salt but never again on water."

Beyond your marine and NASCAR involvements, you've worked with racers and engine builders in other sanctioning organizations, over the past 50 years.

"Actually, there's been involvement with a lot of them. We've been into ARCA, USAC, NHRA, AHRA, the dirt

associations ... like when you're doing that much of a variety it's important that you deal with them in a diplomatic fashion or you'll end up paying a price for failed relationships. Fortunately, we've been able to establish and maintain a good relationship with just about all of them. When they decide to do so, sanctioning organizations can make life difficult for any of us, racers included. Of course, it's their job to keep us all in line because we're always looking for any gray areas in the various rule books. They've got a job to do and so do we."

Moving through the Years to Current Times

"Even though we began the business with a measure of diversification, we've been able to grow further into some additional areas. As time passed we gained some successes that benchmarked the Automotive Specialists brand, if you will. Our involvement with the marine market decreased not because we weren't successful, but because our clients simply got older and retired. And I would speculate that some of our Bonneville involvement also fluctuates a bit because of the average age of the participants that go to the salt as well. But even though this is generally an older group of people, we really enjoy working with them and going to Bonneville whenever possible. It's an entirely different environment that you find at most motorsports events."

Any special projects in which you've been involved you'd like to share?

"Probably one of the more significant projects was our involvement with the evolution of the restrictor plate in NASCAR. This was a particularly intense effort in which we were involved for about a year. In fact, I believe it was at the 1990 Daytona race that we had 30 of the starting field's intake manifolds for that restrictor plate event. If I remember correctly, we had a Second in the ARCA and won the big race. I know we put a considerable amount of research and work into our restrictor plate manifolds. The previous year, we got beat badly at both the Talladega

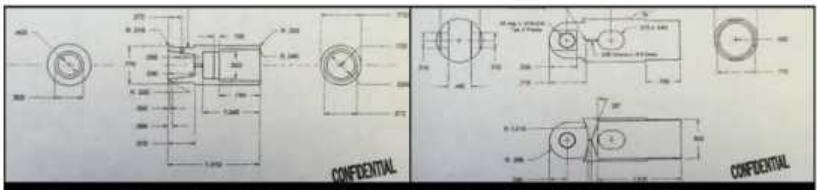


Even today Automotive Specialists are known for their work on 9:1-style engines. But back in 1994 Dorton worked extensively to refine the 9:1-type engine for oval track application. This sheet of autographs shows the winners of five major touring series championships across the country. They were all running Automotive Specialists 9:1 engines, some GM, some Ford.



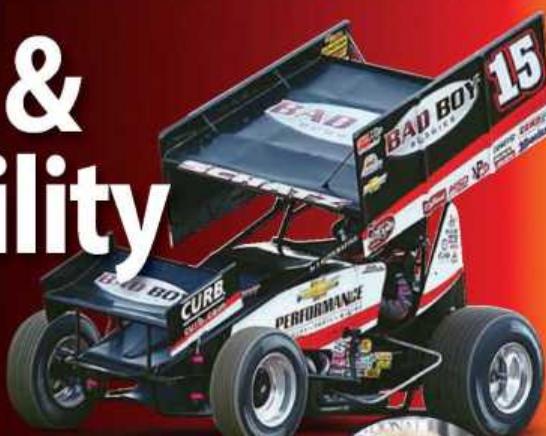
In 2001-02 Keith, along with help from Fred Carrillo designed, had manufactured, tested, and used roller lifters without needle bearing. At the time, Keith could not convince others in the industry of the benefits of the forward-thinking design even though needle bearing failure was a prominent problem of the day.

ULTIMATE RACING



These are the original drawings for Keith's needle bearing-less roller lifters. Later on in 2012 Keith also worked with Crane developing and testing a hydraulic roller lifter capable of 8,000-plus rpm for endurance applications.

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and Daytona races because we hadn't done well with these manifolds. Looking back, I think my employees and family thought I'd become a recluse because I was devoting almost all my time to sorting out what it took to make a restrictor plate intake manifold work. But we got there, anyway. And although I don't think we really gained anything outside that work, we did manage to make a little money because of the sheer number of manifolds that we sold."

Any others you'd like to discuss?

"In 2000, we became involved with the Federal Department of Energy on a variable compression ratio engine project. That certainly was and is a different type of engine for us, in that we weren't looking for lower elapsed time but for other aspects of efficiency.

"And then we also invested a lot of time and effort into developing our own sealed engine package, similar to the ones for ARCA. In this particular project, we did a considerable amount of work with the hydraulic roller camshaft. We found that we could go beyond 8,000 rpm with a hydraulic roller while extending the life of the engine tremendously.

"Of course, I should also mention our involvement with the various land speed classes at Bonneville. I just like going there and we've had a measure of success in that market as well."

How do you go about measuring success?

"Well, I've discovered that you can't do it by counting wins at the track. I mean we've not been a company that does this because there can only be one winner. I prefer having several cars in the same class running our stuff such that when I leave after being at the track, I'll feel successful if they all finished the race. If nothing broke, there weren't any issues and everybody was still running at the end, that's my yardstick for measuring business success.

"But with that said, don't think I don't like winning. Nobody remembers who finished Second, in anything. I mean, when I was in a bike race for MS, I wanted to be the winner. When we were raising funds for that charity, I wanted to raise the most. You can ask

my wife, Patsy. I don't care what the odds or cost may be, I want to win. If we're seeing who can make the most horsepower, I want to be the one who does. That's my personal yardstick. But like I said, if I can populate a given class or group of race cars with more Automotive Specialists products than any other engine builder, that's being successful."

Over time, were there any particular areas of growth?

"I'd say that in the early days, our work with cylinder head modifications was a significant time in the company's development. At the time, we were relying on companies like Edelbrock to come up with good intake manifold designs and we were focused on improvements to cylinder heads. This was primarily during the '70s and '80s time frame. Because we were able to produce so many different kinds of cylinder heads we experienced a fair amount of growth back then. Much of this work was in the NASCAR community, first when they were running big-blocks and later when they went to the small-block."

"Then when Kenny Weld came along with the first automated machining operations, we didn't hop onto that bandwagon at first. We continued to do prototype work, and still do, but we didn't get involved with all that."

"Then there was the hydraulic roller deal I mentioned earlier and as this began to become accepted, we increased our engine sales tenfold, but the downside was these could be run for a season and we'd get them back for rebuilding less frequently. For example, we might get three rebuilds from a customer who, once he switched to the hydraulic-roller setup, would only ship us his engine for rebuild at the season's end. Even though we'd sort of created a monster, it was still an area of notable growth for us."

"And then I'll point to our Bonneville efforts. The thing I really like about these cars is I feel like somebody let me out of the bag and untied my hands and said 'go for it.' It's been like, 'whatever you want to do, do it.' I mean, we haven't had that luxury since some of our early involvement

with the dirt tracks, where there were only a limited number of rules. Plus, our successes at Bonneville came with a fair amount of business growth."

Looking to the Future

I know you're looking ahead for some level of retirement, but you've groomed your son, Jeff, to take on

more and more responsibility. In fact, he's pretty much grown up in the company and I strongly suspect mirrors many of the ways he's seen you run the business, from virtually every aspect possible.

"Before I get into that I'd like to share some observations that I believe the ordinary, non-racing person should

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ULTIMATE RACING



This is a modern-day roller lifter without the needle bearing, which many cam companies currently now sell. Their design is almost a direct copy of what Keith developed back in 2002.



Automotive Specialists machined, assembled, and tested a two-cylinder variable compression engine for Department of Energy back in 2001. The success of that program led the company to develop and build numerous engines for the DoE and ORNL ever since.



Add Publisher to the list of Keith's accomplishments. For years he published his own newsletter called Keith Dorton's Tech Talk.

Today Jeff Dorton, Keith's son, is an integral part of Automotive Specialists. The pair collaborates on almost every project, including dyno testing.



be aware. If you look at the cars on the road today, aside from lower emissions and better fuel economy, consider all the safety features that came from racing. You and I know this, although a lot of it was late coming, but many new vehicle safety features came directly from racing. I think that for somebody, somewhere in the motorsports marketing community, this is a message that needs to be more actively discussed, explained, and practiced outside the racing fraternity in general.

"Now, you asked about Jeff. I think he's tailor made for Automotive Specialists. As you mentioned, he has grown up in this environment. In his forties now, he has not only learned from but participated in much of the company's growth. I think he realizes that the motorsport community, while it's at the core of our business, will continue to change and evolve. Staying involved and watching for signs of change that can also be opportunities for the company will be a key to his success.

"For some time now, he and I have been making business decisions together, so he's already been participating in the running of the company. But looking back, I didn't spend much time with him while he was growing up. I was either racing or trying to build a business, so as he was approaching a double-digit age, I finally realized I needed to spend more time with him before he's grown and I miss the opportunity. So we started go-kart racing. This began bringing us together. Then we moved up to Midg-eets and then mini-sprints. He turned out to be really good driver, plus he liked to work on the cars. So when it came time to consider moving up to a stock car, we talked about it. I told him I wasn't able to afford the move but that I'd stand behind whatever he decided to do.

"After some time, he came to me one evening and said, 'I'd like to talk to you.' What he said was that after a fair amount of thought, he came to the conclusion he was a pretty good race car driver. Then he hesitated and said, but I think I'm a much better engine builder. So that set the course. I think he thought about how drivers have

less control of their destiny, need to struggle for rides and sponsors, the fact that driver careers don't typically last as long as someone in a successful business, and that he had an opportunity to make the business he's in even more successful. So even though he's my son, he's also my business partner and that's how we run the place. I cannot imagine that he won't do as good a job as I have up to now, probably even better."

Let's look on down the road a bit and talk about what you see for the future of Automotive Specialists and motorsports overall.

"Well, first of all there's a lot more that I want to learn about. Even though I can't put in the hours I have in the past, I guess 'retirement' would look like about a 40-hour week instead of a 60 or more hour week. I mean, all my friends that I went to school with have retired and bug me about not spending more time at the beach and that sort of thing. But there are still some projects that come along where I want or need to be here seven days a week, so I do that when it's necessary. I feel really blessed to wake up in the morning and find that I can't wait to get to work. If a person gets to that point, the money will eventually come. I can assure you of that."

"Overall? I think motorsports will continue to evolve. We've seen so many changes come about in the past. Some of this has been driven by technological changes, some by the economy, and some by shifts in our social makeup. But the drive to go fast, compete, and try to be the best at building cars and engines that are competitive should be around for a long time. Look at the growth we've seen in the performance automotive aftermarket. I think when you add this to what's been going on at the OEM level, with all the high-performance cars coming from the car makers, the future of motorsports and the mind-set that populates that part of our society is going to continue growing and prospering. As best I'm able, I plan to be a part of that for as long as I can."

For more information about Automotive Specialists, visit www.automotivespecialists.com. 



Jeff works hand-in-hand with his father on every engine that runs through Automotive Specialists.

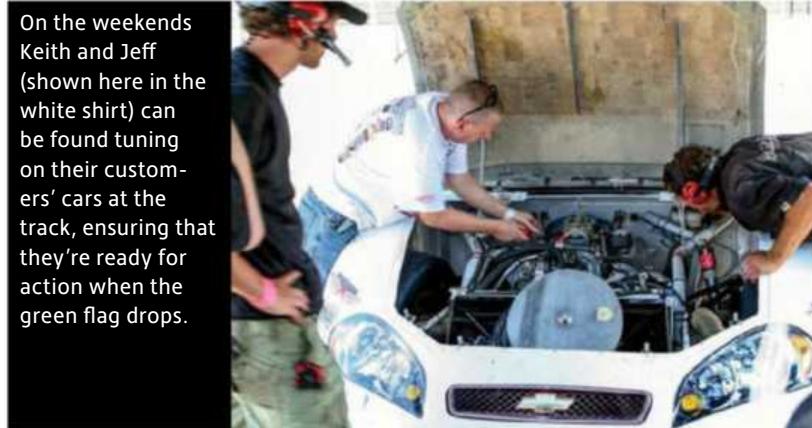


Keith tuning on a carb.



The exterior of Keith's old building.

On the weekends Keith and Jeff (shown here in the white shirt) can be found tuning on their customers' cars at the track, ensuring that they're ready for action when the green flag drops.





Kevin Stoa, a contributor to this story, adjusts the cam timing on one of the race motor's KS Engineering builds.

Racing Valvespring Tech

SOUND RULES TO FOLLOW

TEXT AND PHOTOGRAPHY
BY ARCHIE BOSMAN

Before starting this valvespring story I thought I had a grasp of its mechanics, but then as it developed it became ever more complicated until it reached a point where I doubted if I had any intuitive understanding of how these operations worked!

Happily, the accumulated reams of data were simplified when Dick Boyer entered the picture. Here, courtesy of

Erson Cams, are several sound rules to remember. It's a brief insight developed for those interested in high-performance engine technology that explains the severity of the environment in which the valvespring operates and

some of its relationships with the various functions of the valvetrain.

The primary factors considered when selecting valvesprings in a racing engine are first, the amount of valve lift; and second, engine speed. As engine speed increases so does inertia, which refers to valvetrain resistance to changes in speed and direction.

With regard to the valve when it is fully open—at maximum valve lift—most engine builders desire the valvespring to be within 0.050 to 0.060 inch of coil bound. This almost coil-bound condition

returns the coil spring to a uniform, stable shape on every closing cycle.

If not, the spring exhibits excessive space between the coils and it never calms down and it constantly shakes and wiggles. Therefore, it could be argued that a valvespring operating at moderate lift that doesn't close properly is more inclined to fail with premature weakness or breakage than one operating with higher lift that does close properly.

Aggressive Camshafts: Beyond these two parameters there is the aggressiveness of the camshaft profile to consider. Race engine builders often refer to an aggressive lobe as a "square lobe," which conveys a somewhat exaggerated mental picture. Aggressiveness means how fast the valve is propelled off the valve seat but if it's too aggressive at some point it will throw the lifter off the lobe and the assembly will go out of control, which is particularly arduous, undermining spring longevity.

Race engine builder Jon Kaase warns, "When the valve-to-lifter assembly leaves the cam lobe on the opening side and comes crashing down on the closing side, this affects the entire valvetrain, particularly the valvesprings.

It weakens them and can break them. It also injures solid roller lifter wheels as it bangs them against the camshaft lobes." Overly aggressive cam profiles can also have a nullifying effect, most notably when the air speed fails to move as fast as the valve events.

Seat Pressures: Springs are available as singles, doubles, or triples, and they are selected by the amount of pressure required for the lifter to follow the cam lobe. Naturally you use the lightest spring to control the valve—that is, to keep it closed and not allow it to chatter—because the higher the spring pressure, the more power is absorbed by the engine to operate it.

If a single spring can control the



Race engine valvesprings come in three configurations: single spring, double, and triple. The one that is right for your motor is the one that will produce the correct valvespring seat pressure or load sufficient to close the valve properly. Too weak and the valve flutters, too stiff and you lose power.

valve, adding more spring pressure will not generate more power. On the other hand, cylinder pressure will be lost if the valve chatters. Valve chatter, or valve bounce, means the valve is bouncing off the seat when it closes. Chatter is often caused by insufficient valvespring pressure or by the valve closing too aggressively, despite, sometimes, the lifter following the cam lobe faithfully.

Seat pressures used with flat-tappet camshafts are usually in the 120- to 140-pound range. However, by employing careful running-in procedures with expensive tool steel flat tappets and camshafts, some engine builders adopt 200-pound seat pressures and beyond.

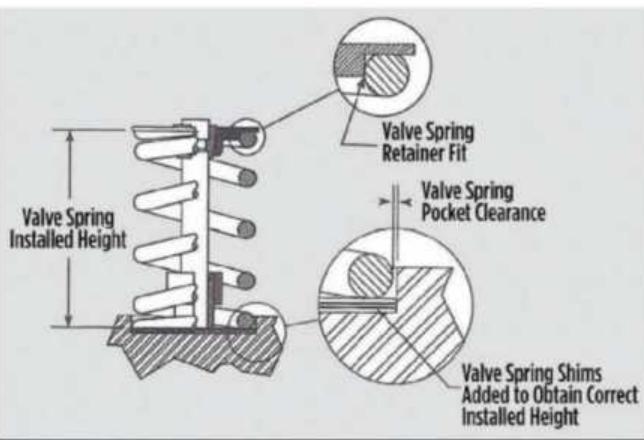
But, on Kaase's Boss Nine hot rod engines, which use a hydraulic roller camshaft and operate with single valvesprings, the seat pressure is around 160 pounds. On their P-51 race engines, which run a solid roller cam and double springs, the seat pressures are 220 to 230 pounds. And on the Mountain Motor Pro Stock race engines, seat pressures are generated

by triple springs and maintained in the 450-pound range. Valvespring open pressures on these engines operate at around 1,200 pounds.

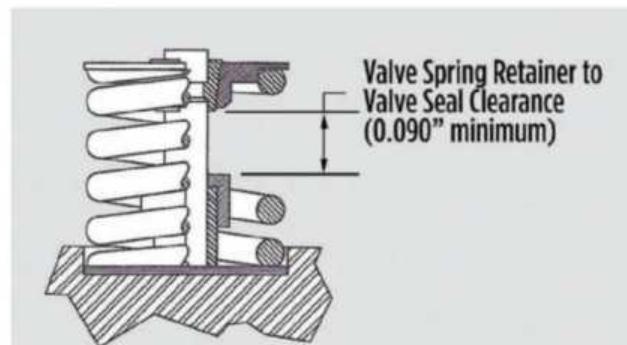
Leading circle track engine builder Kevin Stoa of KS Engineering says, "The worst thing you can do is to lose valvetrain control due to insufficient spring pressure. The horsepower loss caused by adding excessive spring pressure is negligible compared to the effects of insufficient spring pressure, which will lead to failure."

"You could have the best valve in the world," contends Stoa, "but if it floats it can act like a jack hammer and break." Often the good name of the valve maker is blemished when the fault lies in inadequate spring pressure or the valvetrain going out of control. As a consequence the valve can be hammered until it breaks.

What's Valve Float? Valve float occurs when the valvetrain is out of control. It's when the lifters have lost contact with the lobes—when they no longer follow the cam. "If the valvetrain loses control during a dynamometer pull it is audible," Stoa says.



If insufficient clearance exists between pocket wall and spring, you need to machine the pocket with a spring seat cutter to prevent binding. By contrast, excessive clearance between the pocket wall and the spring provokes unwanted, harmful movement.



Most engine builders arrange the valvespring to be within 0.050 to 0.060 inch of coil bound, which returns the spring to a uniform, stable shape on every closing cycle. This measurement is taken between the valvespring coils when the valve is fully open, or when the lifter is resting on the top of the cam lobe. There should also be sufficient clearance between the valvespring retainer and the valve seat.



When you disassemble your motor for a rebuild, it is a good time to check the clearances when the valve is at full compression, or full lift, and the seat pressure or load at the same height. Record the spring length at full open position for each valvespring and re-create those heights on the valvespring rater.

"Instead of the airflow increasing or remaining linear it decreases precipitously. The loss is also apparent in the numbers.

The airflow might be 800 cfm but if it encounters valve float it will instantly drop to, say, 500 or 600 cfm. The fix is not always simple but initially we might experiment by increasing valvespring pressure or reducing rocker arm ratio. Let's say your rocker is 1.6:1, you might reduce it to 1.5:1."

Limited Dirt Modified oval track race cars are powered by 360ci engines that run flat-tappet camshafts with valve lift of around 0.540 to 0.560 inch and a stock diameter spring. On solid roller cam small-block engines, the valve lift is around 0.700 inch. These classes, which are often limited to 8,000 or 8,400 rpm, run valvesprings for an entire season, which amounts to approximately 1,500 laps. Compare these statistics with the

aggressive ramps and high lifts of Pro Stock drag race engines, which are checked after every run and when their closed spring pressures fall from 450 pounds to between 360 to 300 pounds they are replaced. Pro Stock intake valvesprings are usually replaced every sixth or seventh run.

So, for your motor, run the crank around until each valve is fully open and check the clearance between the spring coils. You can use a gap tool to find the gap and then refer to the above recommendations. If the gap is too large, you might need a different spring.

Be sure to check your valvespring seat pressures periodically and before each rebuild. It's easy to do. You just record the valvespring length with the valve closed, remove the spring, and place it in a valvespring rater. Return it to the installed height and read the load. Follow the spring manufacturer's recommendations for proper seat pressures or loads. □

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ULTIMATE RACING



In some forms of short track racing like Sprint Cars, driving etiquette is essential to good health. In stock cars, we often see less skill and more aggression due to lack of consequences. New drivers need to learn from the older drivers who got their education in the old school.

How Not to Drive

SOME TIPS FROM
PAST CHAMPIONS

BY DICK ANDERSON
PHOTOGRAPHY BY BOB BOLLES

If you are a driver, or work with a driver, you need to read this. Not because I wrote it, but because it is a collection of how the drivers who built this sport over the past 40 years feel about the current state of driving in the U.S. And for the record, we are mainly talking about short track Late Model classes.

The catalyst for writing this began with a discussion with Dick Anderson, a legendary driver by anyone's account, about driving tips. It soon became apparent that this needed to be about much more than that. It needed to tell the story once and for all about how the good driving of yesteryear evolved over the years into the mess we now have.

Some things just need to be said. We are long overdue for a discussion about short track driving. I'm not talking about when to lift, when to brake, and when to accelerate ... well not now anyhow, but how to drive the car without wrecking others.

Acceptable Way To Drive

Back in the day, and I'm talking about from the '60s up to the mid to late '90s, the drivers policed themselves. It was widely known that if you knocked someone out of the way on the track to get around, you could usually expect to be confronted and fight about it in the pits after the race.

This is just how it was done "back in the day" and drivers evolved into careful and skilled pilots necessarily to avoid trouble. You needed to learn how to carefully nudge someone out of the way in order to move up to the front. Anything more than that and boy there was going to be trouble.

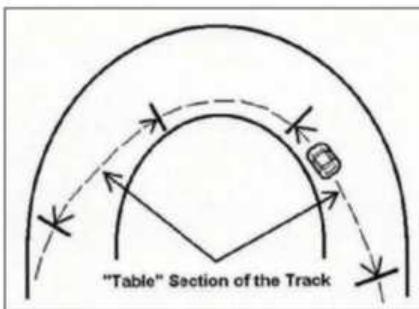
In our current kinder and gentler society, fighting is a big no-no, so what has evolved is a rougher style of driving because there are no consequences to stop it. The officials should be the ones to throw the black flag, everyone knows when it's deserved, but we are all concerned with car count and such, so we just turn a blind eye to the rough driving we all see.

One very experienced official once told a story

ULTIMATE RACING



Over driving the car, as shown with the car behind going sideways, will slow you down. Proper throttle modulation and early lifting provides better exit speed and faster lap times. Newer drivers very often over drive the car and try not to use brakes. Braking sets the car going into the corner so that you can prepare to exit the corner under throttle.



The entry to the corner sets the stage for all of the other portions of the turn. Early lifting, delayed braking (slightly), and early throttle application, all provide for a faster lap time. New drivers tend to think that driving deep into the corner is fast, and it even feels fast. It is not.



In the race, new drivers need to learn situational awareness. Know where the cars around you are located and adjust your line and driving to compete with those cars. Just because a car is alongside you doesn't mean they are in the best place to pass. Maintain the best speed you can with your line and the outcome will be best for you. Let the other driver worry about their line.

about how he overheard a father tell his young daughter during a caution to just run over the driver in front of her on the restart. The official got on his radio and told the flagman to black flag her.

Of course the father went ballistic. In the pits after the race the official confronted the driver and asked her if indeed her father had told her that, reminding her that her mother said she would not tell a lie. She admitted it. This type of thing happens far too often nowadays.

Back in the day, drivers learned how to lean on slower cars to move

them up and out of the way so that they could get on with their race. To the observer, if you saw that and the passing car motored away from the car that got moved, then it was legal and just.

Sure the driver that got moved, if he even knew it happened, was mad, but the anger should be directed at the car, his driving, and so on, not the faster car. Go back to the shop and work on your car so that next week you'll be faster and maybe not get passed.

I spoke with a very successful driver some years ago and we were

discussing the art of moving slower cars out of the way. He said, "If you do it right, they never know it happened." That is a classic line I'll always remember.

The slower car's driver most of the time thinks the car got loose; it's that subtle a move. The very definition of subtle is, "So delicate or precise as to be difficult to analyze or describe." I see far too many drivers who are not very subtle in their driving style.

New Drivers

OK, so I made my point, now onto driver tips. New drivers should learn throttle control. This means that we don't become truly successful until we learn how to modulate the throttle. Many new drivers think they need to be either on or off the throttle. Not true. There are a whole lot of options in between those two.

How you lift the throttle and how you go back to applying throttle is an art that some can learn quickly, and some need more time to master. The legends of the sport that have attained much success will tell you that this is the one thing more than any other, that will make you fast.

In the first section of this piece we talked about moving slower cars out of the way. Using throttle modulation is the way this is done. You must work the throttle to put your car in a position to pass. Coming completely off the throttle and going full throttle quickly puts way too much pressure on the setup and will upset the car.

Overdriving The Car

Many newer drivers will overdrive the car. The use of brakes is necessary to set the car going into the corner so that it will be prepared to accelerate off the corner. The more you learn about your car and the track, the less brakes you'll need, but you'll always need to use some braking, even at high banked and fast racetracks where it seems the cars never brake.

Driving past the proper lift point feels fast, but it is not. The right way, meaning the faster way, is to lift earlier, delay braking a tiny bit, then slow the car just enough to make the turn in, and then when the car is ready, accelerate

through the middle and off the corner.

You'll find that as you execute this maneuver properly, the earlier you let off the throttle, the earlier you will be able to accelerate, and that makes for a faster lap time.

Qualifying

Where this technique of not over driving the car really helps is in qualifying. Many new and some older drivers think they need to drive the car harder in qualifying than they did in practice. That is just not true.

The new tires you use (if your rules allow new tires) will provide the added speed to qualify well. You just need to take advantage of the added grip to allow the car to roll through the corners faster and be sure to hit your marks.

Running off into the corner two or three car lengths deeper than you did in practice will slow you down. If you drive as hard in qualifying as you did in practice, and no more, you will do well.

Working Traffic

The main thing for new drivers to learn when working traffic is to be aware of their surroundings. It's easy to get tunnel vision when you're racing. We've all been there. But as you become more comfortable with the car and where your marks are, you can then bring your concentration out of the tunnel and think about the cars around you.

If a car is under you or outside, your line needs to change from when you were driving alone. The line will be where the other car is not. Two cars cannot drive the same line, but often they try, right?

If you decide to run a different line because another car has taken your normal line away, make the most of it and execute that new line as accurately and fast as possible. Oftentimes, your new line will be quicker through the middle if you're inside, or off the corner if you are on the outside because the other car will be crowded.

If you are being pressured from behind, try to concentrate on your race and make that car work for it. Losing concentration by giving too much attention to the car behind will slow you down and cost you a position in the end.

Race Restarts

In your racing you will always have cautions where you'll need to restart the race. The tip from the legends is to be ready and go as soon as you get the green flag. Anticipate the flagman and jump on one of the only opportunities you might have to pass cars.

A quick reaction time here can make a huge difference in where you end up at the end of the race. Most experienced and successful drivers understand the importance of this part of the race as far as the opportunity it presents.

Dick Anderson watched one of his drivers get jumped on a restart a few years ago and he turned to a bystander and said, "If I had let someone beat me on the restart like that, I'd go home and beat myself," and he meant it. You don't let that opportunity pass by.

In The Race

Once the race has started, or restarted, a driver needs to settle down and be cautious. This doesn't mean giving anything up, it means to

watch out for squirrels. The drivers who are driving over their heads will make mistakes early in the race and you should be ready to avoid the damage.

Races are won by drivers who make it to the end of the race unscathed. Making it to the end should be your primary goal when starting out. As you become more experienced and successful that goal will never go away, you'll just get better at recognizing trouble and better at avoiding it.

Conclusion

We've given you plenty to think about. Our thanks go out to Dick and the other legendary drivers who have contributed to this discussion and who have passed their knowledge onto writers like me.

It would do a new driver good to have discussions with some of the older and more successful drivers at their track. These guys would be happy to help you become better drivers because when you improve your skills, there will be less trouble overall and then everyone wins. ☐



In this example, neither of the two back cars are running the optimum line. The car in front is in the fastest groove, so the back cars are both compromised. In this situation, maintain the best entry you can, hold your line and force the other car to work for the pass. Where both cars are compromised in their line, the car that makes a mistake will be the car that is left behind.



Qualifying is a learned art. What feels fast is not. You should drive the car as hard, but not more so, than you did in practice. The new tires will allow the car to go through the turns faster and accelerate sooner. Over driving the car will not make it faster. This is the secret to faster qualifying times.

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BATTERY CHARGER/
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CENTECH

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66783/60581/62334

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Customer Rating

56", 11 DRAWER
INDUSTRIAL QUALITY
ROLLER CABINET

LOT 69395/67681 shown

• Weights 441 lbs.

• 3458 lb. Capacity

IR-GOVERNOR

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Customer Rating

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WELDING HELMET

WELDING

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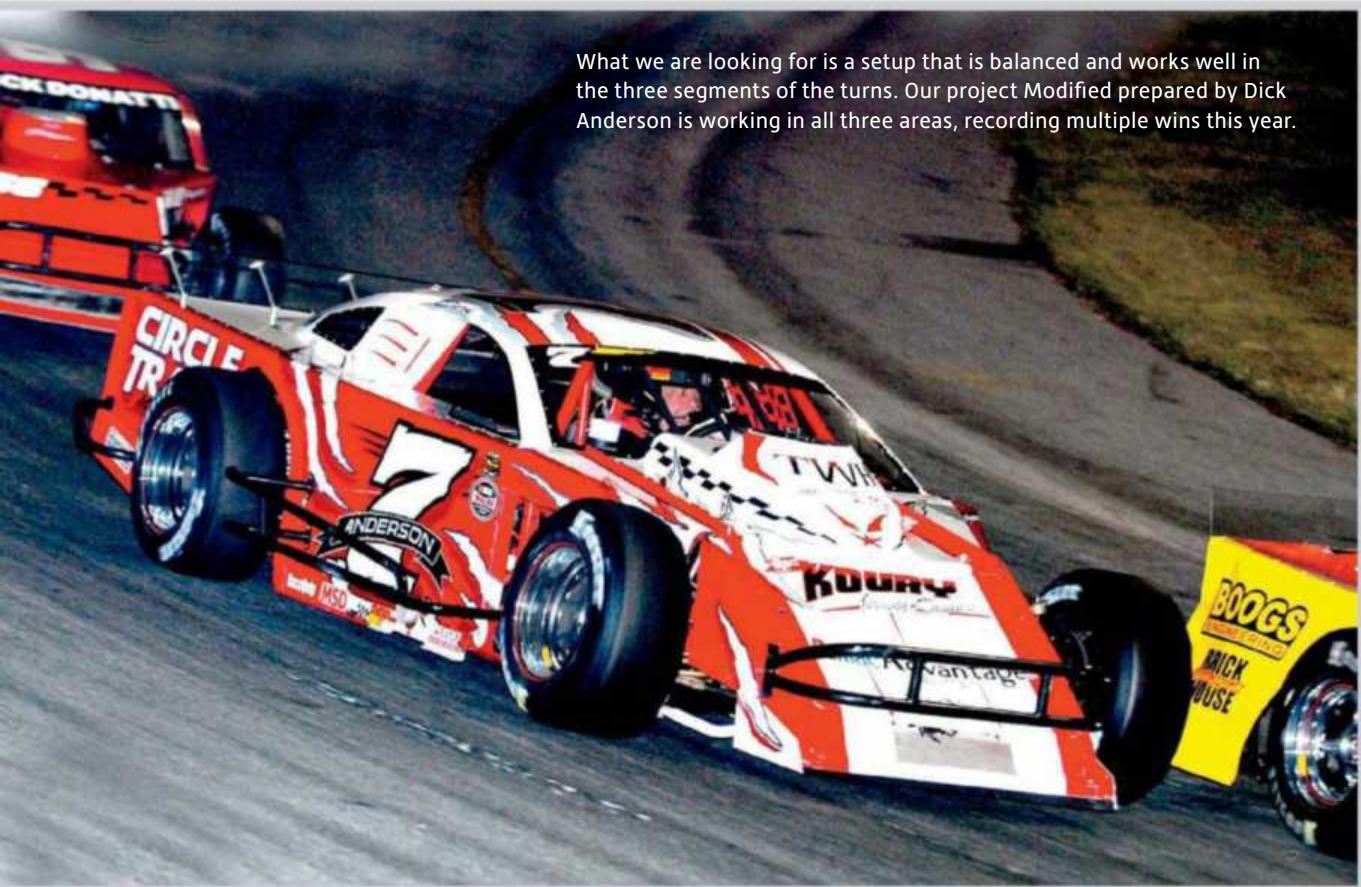
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What we are looking for is a setup that is balanced and works well in the three segments of the turns. Our project Modified prepared by Dick Anderson is working in all three areas, recording multiple wins this year.

Troubleshooting Your Handling

DISCOVERING PROBLEMS AND SOLVING THEM

TEXT AND PHOTOGRAPHY BY BOB BOLLES

Every race team, no matter how successful they have been during the season, will have some complaint with how the car worked. If the car was good and won races, and maybe the Championship, the analysis is more fine-tuned than if you couldn't finish in the Top 5 or 10.

Whatever the situation is, now is the time to review the problems you had, think out a solution for next season and execute those

changes. The least you need to do is set up a plan of how to work out those solutions if a definitive answer cannot be found. To do that, you need to have a good understanding of how the dynamics work in your car.

We are going to try to help you find your problem by focusing on the symptoms. We'll go through the entry, middle turn, and exit segments and name some common problems and offer some possible solutions. We need to keep in mind that some handling problems have multiple sources.

For the sake of limiting this discussion, we will assume that your team has completed proper alignment of the rear end, toed the front wheels correctly, eliminated bumpsteer, and reduced the Ackermann to a minimum. We should also assume that team has evaluated their Moment Center location and redesigned it as necessary for a more efficient frontend dynamic. If not, please go back and read our numerous articles on those subjects. If so, let's continue.

Entry to the Corner

Entry problems usually involve a car that is loose or tight, and this may differ from what the car does in the middle. A loose-in car can change to a car that is tight in the middle and that is maybe the hardest problem to fix.

If the problem was the same on entry as it was in the middle, and maybe off the corner too, then we just have a loose or tight car. When they are different or the middle is fine, but the entry is off, we need to look at what affects the entry handling. What we don't want to do is make changes that will ruin our middle segment performance.

There are three major causes of loose-in. One is brake bias. Too much rear brake percent can cause a loose car only when braking and to the extent you are braking. A track that requires heavy braking on entry is one where brake bias becomes critical.

If you brake lightly or more briefly, then your problem might be somewhere else. That's not to say brakes couldn't be part of the problem, but those kinds of tracks usually see more straight-ahead braking lasting a shorter amount of time than at a track with tight turns and heavy braking lasting well into the turn-in phase.

The second primary reason for loose-in is a left rear shock that has too much rebound resistance. For most stock cars, we never need more rebound in the left rear shock than is needed to control that spring rate. For



Before we evaluate our setup problems, we need to make sure our alignment, bumpsteer, Ackermann, and Moment Center design is correct. No amount of setup changes can solve any of those problems. They will never go away until you fix them specifically.



Our entry problems can be traced to brake bias imbalance. To make small changes to the brake bias, use your balance bar on the brake pedal assembly. For larger changes, you might need to change your master cylinder sizes. Smaller diameter bores produce more braking power for the same pedal pressure.

a 175 lb/in to 225 lb/in spring rate, a shock rate of around a 3 shock, or 75 to 100 pounds at 10.0 inches per second is sufficient. It is never a good idea to free up a car that is tight-in by increasing the rebound in the LR shock.

Next on the list for loose-in is rear alignment, which includes static alignment and rear steer. Your rear suspension system could be steering

both to the right and left through the motion of the right rear during entry. Let's look at how that happens.

As the car enters the corner and begins to turn in, the RR will compress moving toward where it will end up at mid turn. For most three-, and even some four-link suspensions, the initial movement will push the RR wheel back, causing rear steer to the right.



Photo courtesy of STL Racing.com

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Scott Bloomquist, 2014 World 100 Champion

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Shock rates are important to control the speed of movement of each corner of the car. Loose entry problems can sometimes be traced to a left rear shock that is too high in rebound rate holding that corner back from rebounding on entry and unloading that tire. This makes the car loose-in. It would be a good idea to have your shocks rebuilt and dyno'd in the offseason.

Once the motion has progressed, the chassis mount for the link should move through center and start to pull the RR forward to end up either with zero net rear steer, or a slight rear steer to the left.

The motion is usually quick enough so that the car never really goes loose from the rear steer to the right. But, if the RR shock has a lot of compression and slows that movement, then the time where the car is steered right is prolonged and the car could start to go loose.

The only rear shock that should have a higher than normal compression is the LR and that is to provide better bite off the corner, but more on that later. So, think about these three conditions and sort out why you are loose-in by focusing on those areas.

Tight or Loose Middle

Once you correct your entry problem, you might also have corrected your middle problem. If not, let's take a look at what might cause either a tight or loose middle condition. Shocks are almost never the cause of middle handling problems, no matter what you might have read.

Some shock experts would like to think they can correct any handling problem with changes to shock rates and that is just not true. The middle segment is what we call steady state, where the car has settled in to the turn radius and there is very little, if any, movement of the shocks or springs.

If there is no movement of the shocks, then there can be no influence by the shocks on the chassis dynamics, mainly the load distribution. Any residual influence that might be caused by turn entry problems should have been corrected by now because we solved the entry problem first.

The most obvious reasons for being tight or loose through the middle segment of the turn involve the basic spring setup, or so most crew chiefs think. In some cases, this is not true. There are two things at play, handling balance and dynamic, or chassis, balance.

Handling balance is when the driver says I am pushing (tight) or free (loose). The team could conceivably adjust the crossweight percent and make the car temporarily neutral in handling. But that might not solve the underlying problem.

If our setup is loose, meaning the front has more grip than the rear, we can make the car neutral by adding crossweight. But the loose problem might be that the front has more grip because it is more efficient, or wants to roll more than the rear.

We have talked about this in the past, but trust me, it is a big deal. Matching the desires of the two suspension systems is our primary goal in determining the best setup. When both ends are working together, the four tires will be providing the most grip possible, IF the weight distribution is correct to go along with that balanced state.

As I have said many times before, a balanced setup not only provides more speed through the turns, it provides speed for a longer period of time and it is a lot easier on the tires. Having better tires at the end of the race will help you win races.

The telltale sign that the car is dynamically balanced is when the tire temperatures are very close to

even front to rear on each side. A dynamically balanced chassis shows near equal tire temperatures on the left sides and on the right sides. The temperatures side to side will never be the same for short track racing where we turn in the same direction all of the time.

If your tire temps are good and the car is still not neutral in handling,

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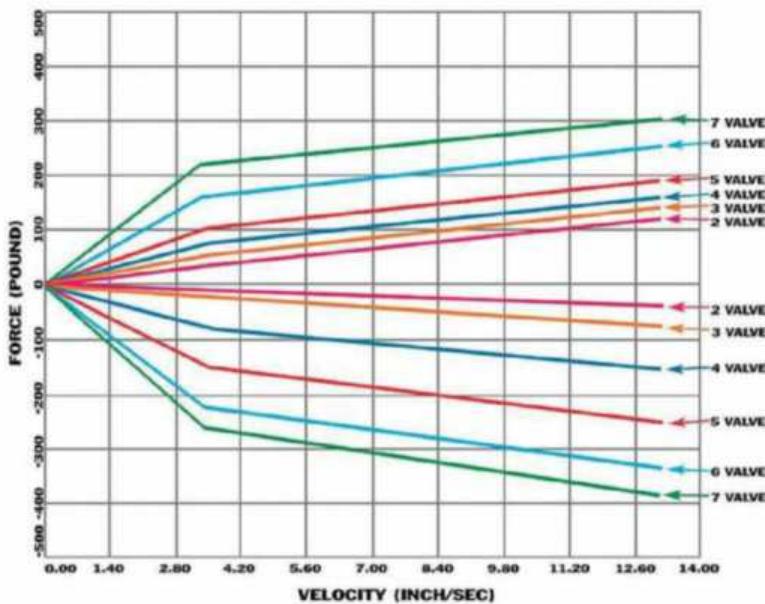
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This shock rate graph shows the value of different numbered shocks. Note that for rebound, a 3 shock has less than 100 pounds of force at 10 inches of speed. If you get up into a 5 shock, it has over 200 pounds of force at 10 inches, the speed the LR shock can be moving on initial entry to the corner. This overcomes a 150- to 175-pound spring and unloads the LR tire.

then look for incorrect weight distribution (crossweight or bite), alignment, or other mechanical issues. I have seen some teams who run the same crossweight percent no matter what and fight the setup making spring and shock changes to no avail.

There is a fixed crossweight that works for every car determined by a combination of the front to rear percent and the un-sprung weight values. Each car has a load transfer at the front and rear and a predetermined amount of load needs to be on each tire at static ride height in order for the tires to be correctly loaded at mid turn.

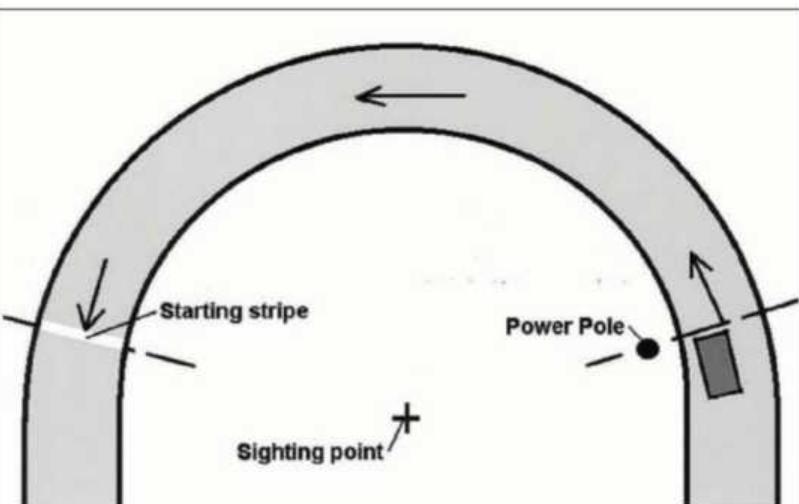
The secret to proper setup is to balance the setup so that each end is in sync with the other end of the car and that makes the load transfer predictable. After all, it is the distribution of loads on the four tires through the turns that will determine how good the setup is and how well your car will perform.

So, how do we balance the setup? If the front is out-rolling the rear and showing a hotter LF tire than the LR, we need to help the rear suspension to roll more. We can do that by lowering the rear Moment Center, or lowering the Panhard bar, if so equipped. We can reduce the RR spring rate or stiffen the LR spring rate.

If the rear is out-rolling the front by showing a cooler LF tire than the LR tire, then we need to raise the rear Moment Center by raising the Panhard bar. Or, we can soften the LR spring and/or stiffen the RR spring.

In addition to those changes, we can also increase the rear spring base to reduce the rear roll by moving the springs out. This works for dirt cars where the top of the coilovers, usually the RR, can be adjusted for width. On a dry slick track, the top mount is moved in toward centerline and on tacky tracks it is moved out.

The idea is to find that balance that the car likes. Once you have achieved that, the car will come alive, it will be much easier to drive and the performance will increase and stay good for a long period of time. This is how teams dominate.



We divide the turn into three segments for evaluation. Turn entry problem solutions must not affect the middle turn handling, just as the turn exit solutions cannot affect the middle handling. To evaluate your turn performance against the competition, take turn segment times and compare. You might be faster than you think. At least you'll know what to work on, engine tuning or setup.

Exit Performance

If your car is good on entry, good through the middle, but loose or tight off the corner, then there are a few things that could be the problem. Let's see what happens with the car on exit.

Past half turn, we are beginning to accelerate. The load shifts from the front to the rear, and naturally the front tires lose grip and the rear tires gain grip from having the added load.

At the same time, as the car accelerates, the rear tires must provide added grip to keep them from spinning from the torque of the engine pushing the car forward. So, the added grip we got from the load transfer is used up by the acceleration forces trying to spin the tires. This trade-off is not always net zero.

This is the point in the discussion where I talk about throttle modulation. If the engine torque overcomes the added grip we got from load transfer, then the car will go loose as we



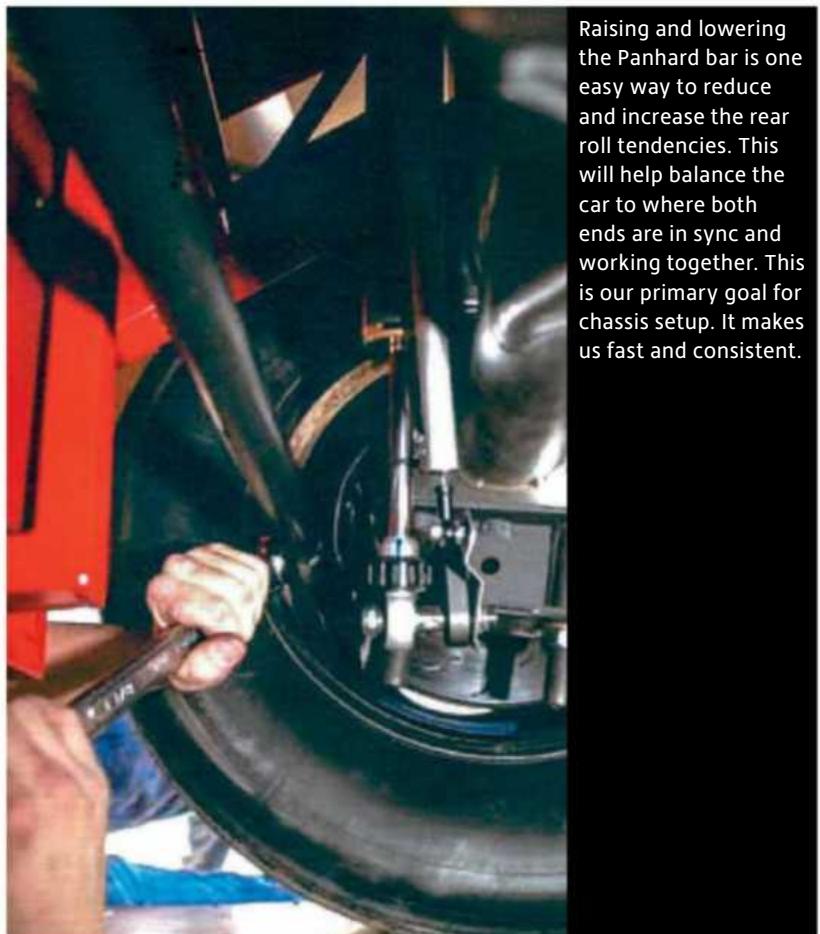
For basic setup changes, we change spring rates and rear Moment Center heights using our Panhard bar where so equipped. This upper coilover mount on the Beak Built project car is adjustable for lateral position. We move it in for dry slick track conditions and out for tacky conditions making for a wider spring base, which reduces rear roll.

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Raising and lowering the Panhard bar is one easy way to reduce and increase the rear roll tendencies. This will help balance the car to where both ends are in sync and working together. This is our primary goal for chassis setup. It makes us fast and consistent.



For bite off the corners, we employ pull bars, which can serve multiple roles. It absorbs the shock of initial throttle application and allows the rear end to rotate. This rotation can be utilized to produce rear steer to the left to tighten the car off the corners.

accelerate. To keep from going loose, we might need to add more grip to the rear somehow, or not go to full throttle.

In many cases, especially with dirt cars, the driver may not be able to apply full power initially, or even ever during a race. Top-winning dirt Late Model drivers have stated that they have won races and never gone to full throttle. Throttle modulation for any type of racing is the key to controlling the rear grip in your race car. It is advanced, but must be learned at some point in a driver's career if they expect to win races.

Much of the grip loss from acceleration happens on the initial application of power. There are a few tricks whereby we can gain rear grip on initial acceleration. One way is to add compression rate to the LR shock. That way, when the car squats on initial acceleration, the load will increase on the LR as well as the RF tires. The increase in crossweight will momentarily tighten the car while the shock is in motion, but goes away quickly when the rear of the car settles in.

A more prolonged approach would be to initiate rear steer to the left. We do that by adding a pull bar third link, for those systems set up for that, and stagger the height of the trailing arms so that the left arm is lower than the right arm. When the rear end rotates as the third link is pulled out, the left wheel goes back farther than the right wheel, causing rear steer to the left to tighten the car up off the corner.

An old-school method of adding crossweight during acceleration is to mount the LR spring in front of the axle tube on a pull bar system so that when the rear end rotates, the LR spring will compress and the RR spring will decompress, again increasing the crossweight.

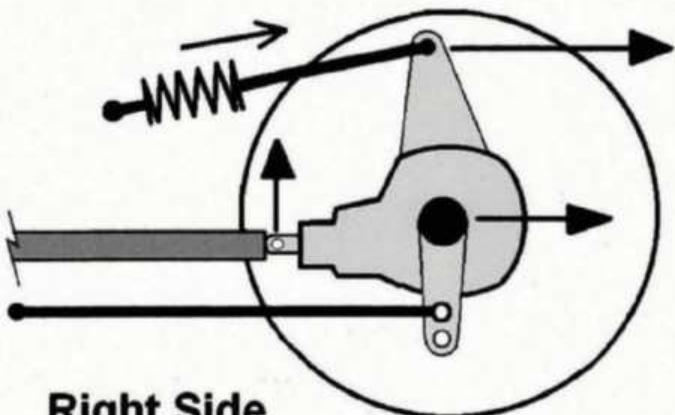
If you have done all you can to provide extra rear grip on acceleration and you are still loose off, then the driver must modulate the throttle until he can go full throttle. It is easy to just stomp the throttle, but as the driver gains experience, they will learn how to modulate to gain momentum off the corners.

Conclusion

This entire exercise is intended to get you thinking about perfecting your setup for the coming season. While you have the time in the offseason, you can think out where the car might have been off last year and maybe find solutions to those problems.

A big part of the attraction to racing is the development of the art of setup. And believe me it is an art. Some catch on easily and for some it takes more time. The better we understand what is happening to our car through the three turn segments, the quicker we can find a solution to any problems we might have.

Remember to solve all of your alignment and Moment Center problems first before you get into the setup of the four springs and shocks. Problems with any of those items could be most of your problem and if left unsolved will always haunt you. Misalignment and improper placement of the front Moment Center can never be corrected with basic setup changes. ☐



Right Side

When the rear end rotates as the pull bar extends, the entire rear axle assembly moves to the rear. If the left trailing arm is mounted lower than the right one, the left wheel will move back farther creating rear steer to the left, which tightens the car under acceleration.

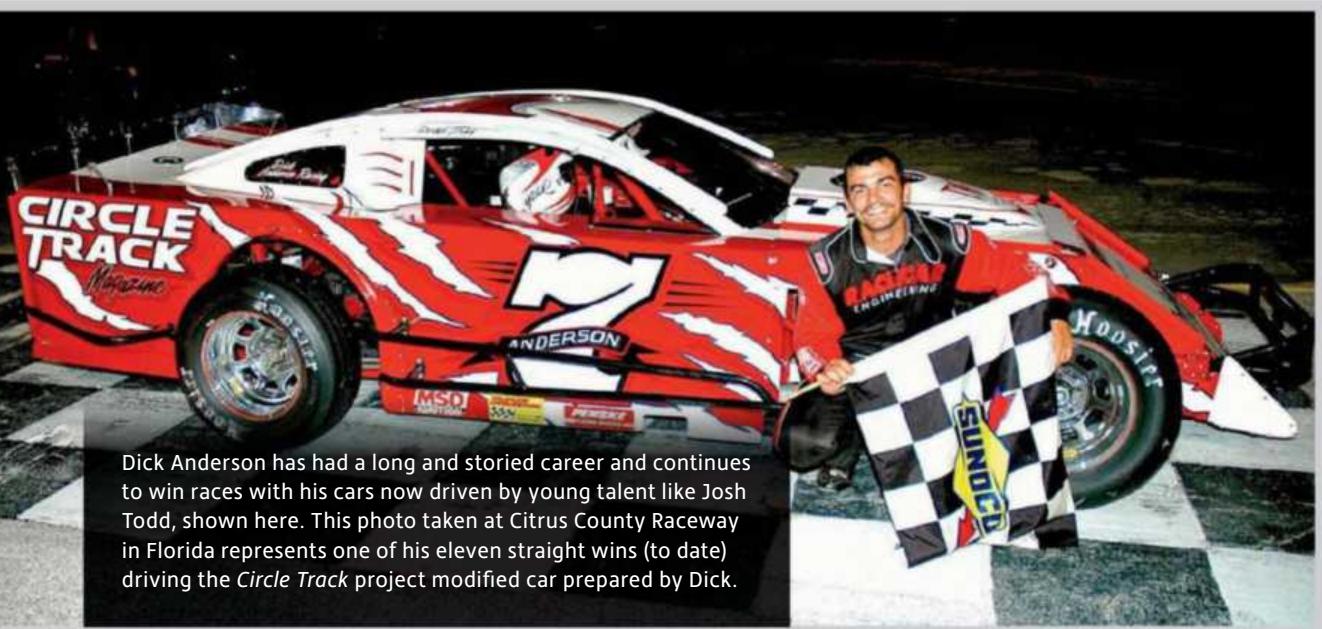


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Dick Anderson has had a long and storied career and continues to win races with his cars now driven by young talent like Josh Todd, shown here. This photo taken at Citrus County Raceway in Florida represents one of his eleven straight wins (to date) driving the *Circle Track* project modified car prepared by Dick.

Getting Rewired

TIPS ON RACE CAR WIRING SYSTEMS

TEXT BY DICK ANDERSON
PHOTOGRAPHY BY BOB BOLLES

We have talked about post-season evaluation of your race car and part of that process is examining and possibly rewiring the car. If you compiled a list of what causes most on-track failures, faulty wiring would be right near the top.

A top MSD rep says that most of the ignition box failures they see result from bad ground wires to the ignition. There is a process and methods that can help you avoid wiring and electrical failures and the following is from an interview with noted short track legend, Dick Anderson.

Dick has wired hundreds, if not thousands, of race cars in his long and storied career. In his words, "I know these things because I have made all of the mistakes." To say that he has encountered most, if not all, of the electrical problems you will run into in your career is an understatement.

This is not a "how-to" per se, but a "what not to do" and a how to do it right the first time article. Some of it will be obvious, or not, and

some of it will be new and interesting to consider. So let's get started.

Materials:

When you begin the rewiring of your car, choose good material, as in new wire and quality terminals. Use a gauge of wire sufficient to carry the amperage load for the work it will be doing. Always use closed-end terminals, not the U type.

It is not a good idea to use push-on terminals. These can loosen and come off. If your gauge or other electrical components have those types of male terminals, you can drill a small hole in the blade and solder your wire to the terminal, then use shrink wrap to cover the connection. Remember to slide the shrink wrap over the wire before soldering.

Use new grommets where the wires will pass through small holes and insulated bands for securing the wires. Your connections might have to be waterproof if you are running on dirt and a good washing is in order after a race weekend.

Replace all of the switches each time you rewire. These take a lot of abuse and can fail. Switches are cheap and DNFs are expensive.



1

Before you get started, plan out the route of your wiring layout. Think out where the wires need to be run to make the system more efficient. Put them where they will be easily accessible in case there is a problem and you need to trace the wires. Use new wires because the insulation can get old and stiff, resulting in a crack that can hold water and corrode the wires or cause a short.

Make A Plan:

Plan out your wiring. Choose the path the wires will follow. Choose the locations of all of your switches, gauges, ignition box, battery, and charging posts. If your past layout was deficient, now is the time to rethink the entire plan.

If you have removed the body in preparation for installing a new one, you will now have easy access to all of the attachment points as well as the gauge panel and switches. At this point, you have a blank sheet of paper and can do anything that works best.

The best wiring plan is the one that makes access to the connections the easiest and following the wires from end to end possible. When an electrical problem arises at the races, there is little time to find the problem and fix it. Having easy access shortens the process.

An example would be to use screws or Dzus fasteners to attach the gauge panel to the dash so that it could be easily removed to access the connections at the rear. If you rivet the panel, you'll have a very hard time getting it off and back on.

Plan the route of the wires. There are some wires that should not come in close proximity to other wires. The radio wires must be kept clear of the ignition wires to reduce interference.

The same is true of the ignition wire and the coil wire. These should not be closer than 1 inch. Many teams will tie-wrap these two wires together,



2

The ground wires can be a source of problems. We usually concentrate on the hot wires, but a good ground is equally important. Dick welds bolts to the frame at the front and rear of the cockpit to attach the ground wires to. Here we see the battery ground wire attached to a bolt welded to the frame. Most of the other ground wires from the gauges and switches are attached to a bolt welded to the frame up front reducing the amount of wires running through the car. The exception for Dick is the ground for the ignition box. It is run from the box to the battery negative post and not through the frame.



3

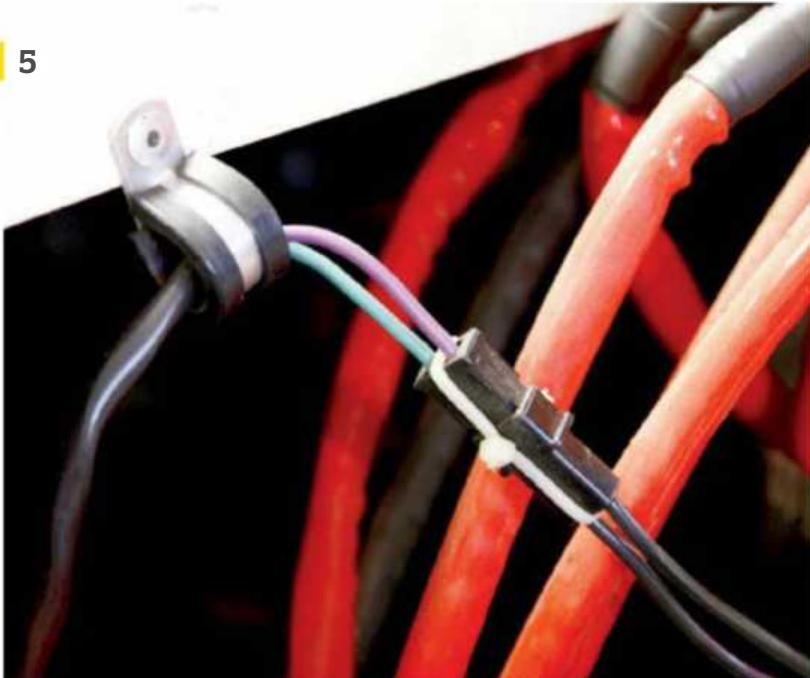
These are the battery charging posts. Note the shrink wrap that protects and secures the terminals. Use shrink wrap on all of your terminal connections after you have soldered them in place. Always use closed-end terminals and not the U type of terminal. For post connections, use a lock washer and blue Loctite. Try to avoid push-on blade terminals. You can drill a small hole in the blade and solder the wire to the blade and then use shrink wrap over the connection.

4



Where wires will run along the tubing or firewall, use insulated loop connections and plastic wire covers. Rubbing on sharp surfaces and through holes is a major cause of wires shorting out and electrical failures. Always use rubber grommets when running wires through the firewall or other sheetmetal panels.

5



For this ignition box to distributor connector Dick uses a small tie-wrap that is run around the connector to make sure it does not disconnect. Note that for MSD ignition, there are two purple wires, one coming from the box and one from the distributor. These wires are never to be connected. When installing new connectors, many teams will join these wires and the result is a motor that does not run very well.

which is a very bad idea. The pulse from the coil wire is very strong and interferes with the ignition signal.

Staying Grounded

As we stated above, your ground wires are just as important as the hot wires. One won't work without the other. Dick suggests welding bolts to the frame to attach ground wires to at the ends of the car.

All of the ground wires in the cockpit can be run to the forward frame grounding post and the battery ground can be run to the frame at the rear or wherever you mount the battery. The exception in his case is the ignition ground, which he runs separate from the other ground wires directly to the battery ground.

Preparing the Terminals

As we stated, always use closed terminals. If your terminals have the plastic cover, remove that. Always solder the terminal where the wire end is installed. Never crimp the terminal and expect the wire to stay there forever. It won't.

You can fold the bare wire end double to fill the terminal hole. Then solder the terminal and wire. Use shrink wrap to encase the connections. This serves two purposes, one is to insulate the terminal and the other is to add support to the end of the wire so that it will be less likely to bend and break.

If your terminal is attached by a nut to a post, use lock washers. If it is a very important connection, and most are, use blue Loctite on the post. Many electrical failures are random and due to loose connections that are hard to trace. A quick look and the connection looks good, but if it is loose, it will cause an interruption of the current flow periodically.

Switches and Gauges

Dick recommends installing new switches each time you rewire or for each new season. Many electrical failures can be traced to a bad switch. These items can take a lot of abuse during the season and they are a fairly inexpensive item.

As for the gauges, new designs are



Dick also installs quick disconnects for the hot and ground wires to the coil. This is so that he can remove the engine plate that the coil is attached to with the coil still attached. Note also these connections have shrink wrap over them to secure the connections. They will not come apart unless they are cut on purpose.

coming out all the time. If you have a hard time seeing your gauges at night, then the new brightly lit types might be the thing to now install. According to Dick, it is important to use a high-quality tachometer. Accuracy of rpm is very important to choosing the right gear.

Connectors

You might need to add connectors to your wiring to make removal of certain components easy. Ignition boxes might come with simple connectors and you might want to replace those with better ones that might be more waterproof.

A tip Dick offered, and one most of us older racers already know, is concerning the MSD ignition boxes. Many teams will replace the connections between the box and the distributor. Out of the box, one of the wires is a purple wire. Out of the distributor is a purple and black wire. These two wires are NOT TO BE CONNECTED.

I cannot tell you how many teams have connected these wires thinking purple must go with purple. It does not. Note the location of each wire on both sides of the original connectors and identify them with markings before you cut off the old connector.

Then when you attach the new connector, you will be able to match the proper wires. For push-on male to female mid-wire connectors, always use a shrink wrap over the connection to make sure it does not come un-connected. You can cut the shrink wrap to disconnect the wires later on.

Wiring Harness

Now that you have a good idea of how you want to wire your car, the routes, the connections, and the

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7



The coil Dick uses is attached to the back side of the rear engine plate to keep it protected and cooler. He runs a 14-inch coil wire to the distributor. Never run the ignition wires from the box close to the coil wire. Some teams tie-wrap these together and the powerful pulse from the coil wire interferes with the signal coming from the ignition box to the distributor. A separation of at least 1 inch is necessary.

switches and gauges, think about duplicating the wiring just in case you need it.

What professional teams do, and it is just as important for you to do, is, once they determine the wiring layout and have measured the wire lengths for each run, they just make two or more of the wires.

If certain wires are joined for a specific length, then you can create a wiring harness custom designed for your car. Then when the old season is over, you'll have a ready-made harness to install for next year.

In the unfortunate case of a fire, and it does happen, you can remove all of the old wiring and what they were attached to, and reinstall all new switches, gauges, ignition box, and so on, and the wiring will be ready to install quickly and easily.

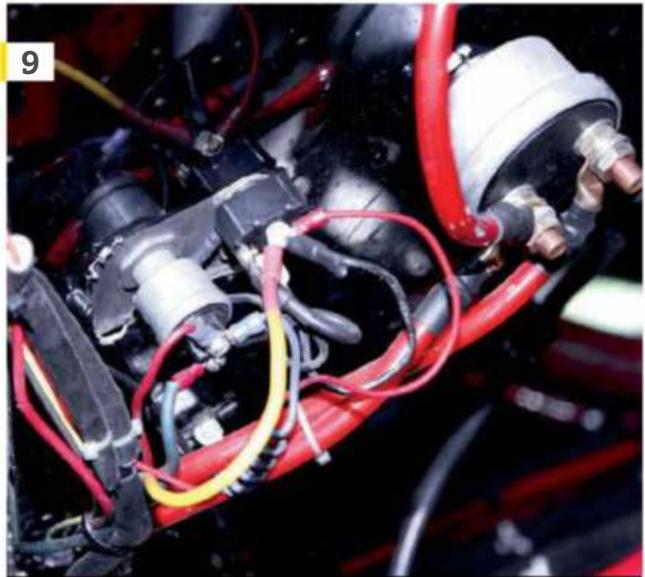
It just takes a little more time to duplicate your wiring into a spare wiring harness. Make two or three

8



Dick has acquired a "Cup"-style ignition box and it comes with very good connectors. You might want to upgrade your ignition connectors, but be sure to label the wires on each side so that you don't mix up the order. Connections that are more waterproof might work better for dirt cars that get washed a lot.

9



This shows the power on/off switch and starter button from below. We found that Dick has crimped some of the terminal connections, contrary to our advice. There is also limited use of shrink wrap here. When you rewire your car, change out the switches too and install new ones. These are a common source of failure.

if you like, the parts are very inexpensive. Also keep spare switches on hand in your race trailer so that if one breaks or fails to function, you'll be able to replace it quickly.

Conclusion

Seriously consider replacing the wiring and switches at least at the end of the season. Nothing on the car is cheaper and nothing can cause more headache than electrical problems. It can cost you a race, or the season Championship.

You have a lot of time in the off-season and for your team, designate a qualified person to be in charge of the wiring and the process of rewiring the car as well as being the pointman for mid-season troubleshooting of electrical problems. Don't assume everything will be OK for next season with what you have, take the effort to make sure. It's so much fun when things don't go wrong. 



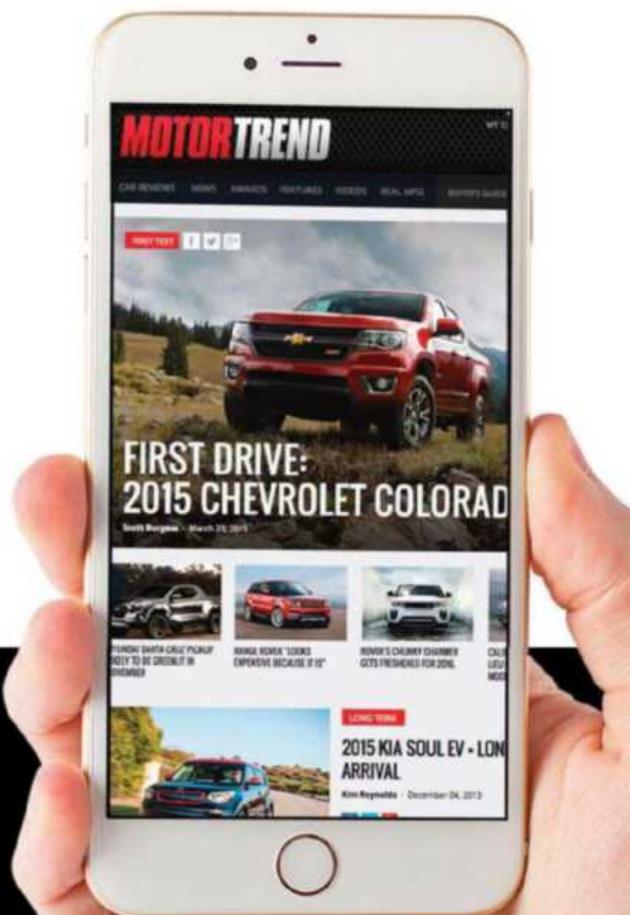
When you run your plug wires, secure them from movement. In one of our videos we shot showing the right front of Dick's late-model car, he noticed how much the plug wires were swinging out and back on each lap. This could be a source of plug wires coming off during your race. If you've ever wondered how that happens, this might be a clue.

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ULTIMATE RACING



There are many ways to stay active during the offseason. Getting to the PRI Trade Show is a good start, but it's not all you can do.

PERFORMANCE RACING INDUSTRY FACEBOOK PHOTO

Avoiding Hibernation

STAYING RELEVANT DURING THE OFFSEASON CAN TRANSLATE INTO NEW IDEAS, NEW FANS, AND MORE SUPPORT

TEXT AND PHOTOGRAPHY BY MATT PANURE

The season has wrapped up. Depending on where you live it's time for that long draught from throttle therapy that could last between October and April. Some will have the chance to compete in the big late fall/early winter shows, but eventually the season will draw to a close. As the holidays hit, racing strays from your mind, that recliner starts feeling too good on Saturday and Sunday, and there is plenty of football or hockey to keep your attention.

It's no surprise during those winter months a lot of drivers tend to go into their shells. Sure, you work on the car to get it ready for the next

season (see Bob's articles on refreshing your race car), but even that can be part of the problem. If in the past you've worked in a solid groove between your place of relaxation and the shop, you might be missing out on some great offseason opportunities. Racing is a very social sport. Racers thrive on interaction with other racers, fans, and sponsors.

Racer-to-racer interaction is critical to the development of our sport, especially during the offseason. That's when there is time to explore new products, discuss what worked and what didn't work, and get in the promoter's ear about what needs to change. A group of racers is a powerful entity when it comes to a promoter who might be on the fence about rules, divisions, race nights, or other parts of the program. The offseason, when the pressure of competition doesn't weigh as heavy, is the best time for a group of racers to come together and get on the same page.

Fans thrive on that social aspect too. Short track racing is unique in that fans have much easier access to their heroes. It's a huge advantage on which racers can capitalize, but they have to make sure to reach out. Fans get starved for news and desperately want to know what you're up to, when and where you're racing this year, what your new paint scheme will be, and so on. They want to get excited about coming to watch you race. Let's face it; you want to get excited about it too.

Take, for example, the sport of football. The season runs from August to the first week in February, but has become a yearlong newsmaker with the draft, free agency, and training camps. Some of the characters of the sport also keep the sport relevant during the offseason by their antics, but no one needs to go there. However, that constant stream serves as a great example of how to stay relevant in the offseason.

There are a lot of very simple (and free!) ways to stay relevant to your fan base and your sponsors throughout the winter months. Before getting into those we should remind you to look at Ernie Saxton's monthly "Show Me the Money" column. He gives you a ton of great tips on how to prospect, cold call, propose, and ultimately sell sponsorship for your race team. We're going to examine some ways to keep your fans and current sponsors happy, which will serve as some high-powered ammunition in trying to secure new partners.

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Attend a Trade Show

This one may seem obvious, but there is a lot more to the trade show than doing some early or late Christmas shopping. The potential benefits are plentiful and could provide a huge boost to any race team for the following season.

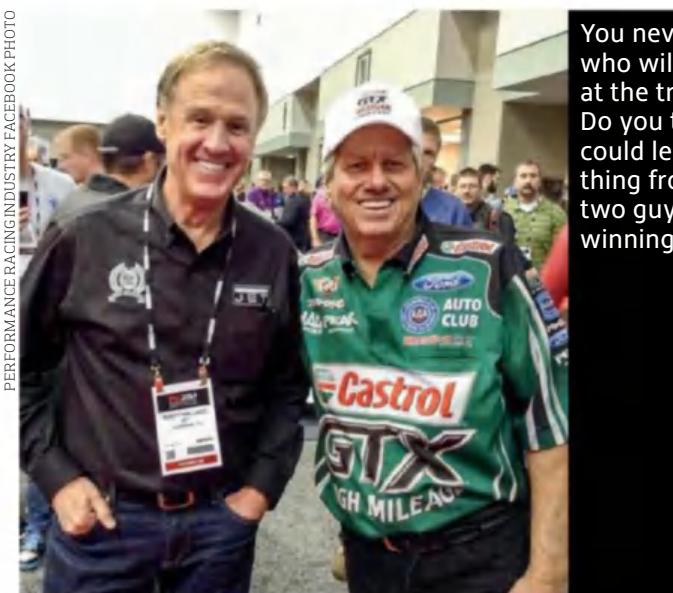
One of the biggest challenges of a race team when in building or rebuilding mode is to do any of their shopping in person—to interact with multiple part suppliers. The trade show gives you a chance to interact with your favorite part suppliers, or maybe their competitors. Don't be afraid to do a little research. Learn about the new

products, get them in your hands, ask questions, or find out if there is any new technology on the way. Most trade show booths are well staffed and they want to answer your questions about their products.

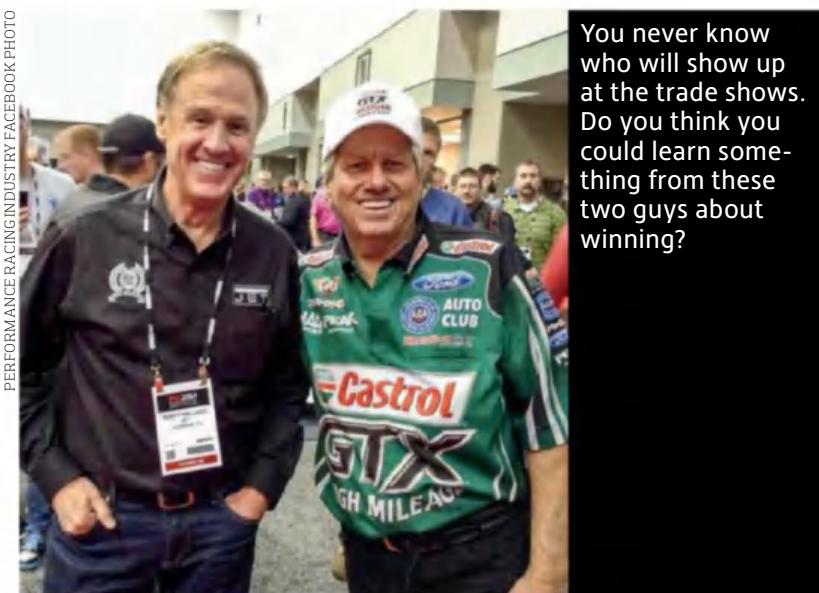
It's important to keep moving through the show. If you spend an hour talking to your favorite shock guy, you might not have time to ask questions about that new rear end assembly you've had your eye on. Plus, that booth could be clear across the hall. Since most trade shows go more than one day, don't be afraid to plan out at least one of those days. Depending on the show, there are



Aside from perusing the trade show floor and socializing with other drivers, there are many seminars at PRI and other shows that can be extremely beneficial to your race team.



You never know who will show up at the trade shows. Do you think you could learn something from these two guys about winning?





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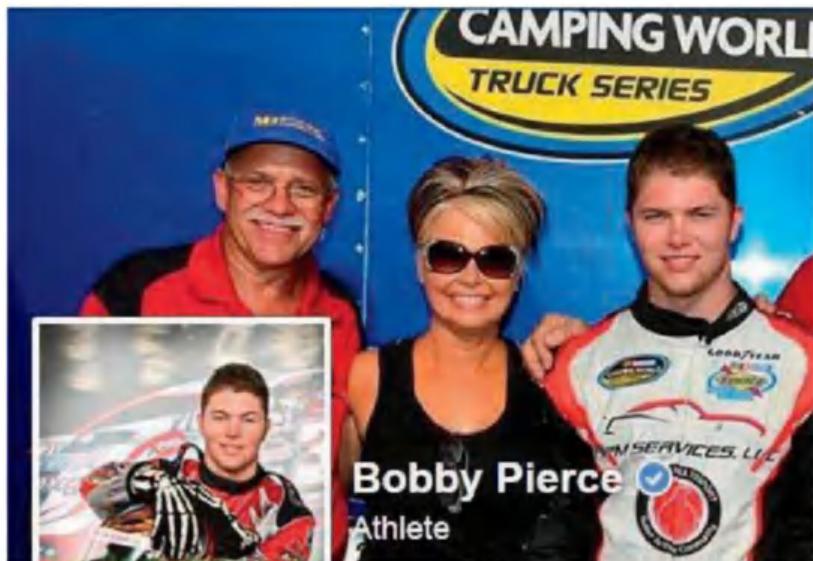
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ULTIMATE RACING



There are some good regional shows like the Midwest Racers' Auction and Expo. These shows give you a better chance to run into people you know, and maybe a chance to bend the ear of your promoter.



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Your personal Facebook page might work, but look at the number of followers here. Your personal page has a cutoff point. Bobby Pierce, whose career is just beginning, is already at 45,000 and growing.

AVOIDING HIBERNATION

floorplans and schedules available ahead of time.

No matter your efficiency, this shouldn't just be a shopping trip. Just like the mall, a trade show is the place for the racer to do some shopping and socializing. Did you see that guy who beat you every week or a hot shot racer from another track walking down the aisle? What products are they looking at? Who are they talking to? Have a little chat. Find out.

As we said earlier, racing is a very social sport. In your conversations, there is a good chance you'll find some common ground. Did you both see that new shock that would enhance the racing in your division, but you're afraid that the promoter might not allow it? There is strength in numbers. Grab some other competitors, get some information, and pass it along to the promoter at the next rules meeting. In fact, the chances are pretty good he might be there. Take him over to the booth to speak with the product suppliers. You'd be amazed how quickly and efficiently things can get done at a trade show versus trying to rally everyone over the phone or get them to a meeting.

Be on your game. The right questions, the right decisions, and a good gathering of information could translate into positive results once the season comes.

Without question the top choice in trade shows is the PRI Show in Indianapolis. Every major circle track parts supplier heads there to show their wares. Because of this chassis builders, engine builders, sanctioning bodies, and promoters often are not too far away. However, not everyone can make it to PRI. The good news is that there are many regional trade shows that can be just as beneficial.

Shows like the Midwest Racers' Expo, Heartland Auto Racing Show, and North American Motorsports Expo offer just as good of a chance to socialize with fellow racers and check out new technology, usually from local and regional suppliers. Just like PRI they often have seminars that can be very beneficial. The Midwest Racers' Expo is also a swap meet of sorts, where racers auction off old parts. The

bargain-hunting racer who can make the most of being thrifty can thrive here.

Keep Your Social Media Game Strong

As we said earlier, fans are starved for their racing fix during the offseason months. The trade show and shop days are usually enough to get the team through the long offseason, but the fan wants to see the light at the end of the tunnel. If you're the one who helps provide that light, you might gain some new fans in the offseason. One of those fans might have a business that would look good on your race car too.

Start with the basics. You may have your own personal Facebook page to use for racing updates, which comes with the good and the bad. There are some benefits to using your personal page. A race fan who is in the stands would love to see you accept their request to be a "friend." It's much more meaningful than them adding your fan page to their feed. If you accept their request, they know you took the time to do it. In our crazy, mixed-up, electronically driven world, it has become an incredible form of making a connection. There is also a personal touch added when the fan sees your page. They want to know what YOU think. They know that you're updating your personal page while it could be you, a hired PR person, or your third cousin updating your fan page.

While that personal touch is nice, the benefits of a fan page are numerous. Your potential reach is much greater with a fan page than it is versus advertising to your "friends." Facebook will limit how many friends you can have on your personal page, but you could gain tens of thousands of followers on your fan page. Privacy is also an issue with the personal page. You may not even know it, but you could have strict privacy settings where outsiders can't see your updates. Maybe that isn't a bad thing if you want to keep tight with your family and friends. When it comes to your race team, you want everyone to access that information. The fan

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ULTIMATE RACING

by Pierce

PAGE INFO

Start Date	Born on November 24, 1996
Short Description	Is a young talented dirt car driver from Oakwood, IL who is taking on the Dirt Car community by storm.
Awards	www.bobbypierceracing.com 2013 !!!!!! 2012... See More
Gender	Male
Personal Information	Favorite Dirt Driver - My dad Bob Pierce. Favorite Nascar Driver- Tony Stewart Favorite Quote - "Refuse to Lose" Racing Goal - Winning The World 100
Personal Interests	Riding 4 wheelers, basketball, football, playing video games & racing
Website	www.bobbypierceracing.com

Make the most of the bio portion on your social media page. The fans love to know more about you. It's even better if they feel like they have a connection with you.

page can allow that without giving fans access to your life away from the race car.

The Facebook "group" page has seen a sharp decline. It is best to stay away from these. In most cases, you either have to invite people or accept their request to join the group. They are very private and almost seem too difficult to use when seeking out news and pictures. It's best to stick with your personal or fan page.

The personal page versus fan page is Facebook-only phenomenon. Twitter, Instagram, and YouTube pages are similar to the fan page, unless you list your account as private. If you want to use one of these be sure to leave your account public and be very aware that anyone can see what you post.

Now that you've made the decision which page and which social media sites to use, be sure to make the most of it. The biography is key (it's also specific to the fan-style page). Fans like to do research on their favorite drivers. Let them know about your accomplishments. From time-to-time someone researching a story might check there as well. Although it might sound odd, sometimes it's easier than hitting your website.

Once you've got the page up and running, make good use of it. Balance is important. Don't post too little, don't post too much. If you post infrequently, not only will fans forget, but your page will not perform like it can, especially on Facebook where pages that get the best interaction show up higher and more frequently on newsfeeds. If you post too much, fans may un-follow. They want updates, but there needs to be something of substance to it.

There are plenty of different types of posts you can put up about you and your race team during the offseason. Throw up some pictures from the awards banquet, post pictures of your race car's progress, and let them know what's going on. It may be difficult, but check with your promoter to see if you can release some race dates. Depending on where you race, your promoter might not have the schedule done until after the New Year or later. Be patient, but don't feel bad about

Awards	www.bobbypierceracing.com 2013 !!!!!! 2012 6 wins... top 10 in nation 2011 54 Starts 6 Wins... 27 top 5's... 38 top 10's (Super Late Model Full Time) UMP "Rookie of the year" Top 10 in National points 2010 40 Crate Starts... 16 Wins... 37 top 5's... 39 top 10's 29 Super Starts... 4 top 5's... 16 top 10's UMP IL State Crate LM Points Champion Farmer City Raceway Crate LM Track Champion Pierce's Vermillion County Speedway Crate LM Track Champion 2009 36 Starts... 7 Wins... 23 top 5's... 34 top 10's (Crate LM) 1 Kidmodz Win 14th in UMP Pro Crate LM National Points 7th in UMP Pro Crate LM North Region Points 2008 KIDMODZ 33 Starts... 16 Wins... 2 exhibition wins AFCO Kidmodz Racing Series Champion 2007 QUARTER MIDGET 26 Feature Wins out of 45 THQMA Senior Honda Points Champion THQMA Light 160 points Champion 2nd in Light 160 Regional Points 2006 QUARTER MIDGET 5 Feature Wins
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Here is what happens when you "see more" under the awards section. If someone is researching a story or needs some quick info, this is a great place to find it.

asking a few times when that schedule will be done. Let the fans know when and where they can see you race as soon as possible. Just like you, they like to make plans ahead of time.

If the racing news is slow, post about some other things happening. For example, there is nothing more sacred than Green Bay Packer football in Wisconsin on Sundays during the offseason. The racing community turns green and gold during those months. Fans love to see their favorite race car driver at the game or posting about their favorite team. If you can make that connection or a similar one, you'll win over fans.

Remember, interaction is huge. That's what social media is all about. If someone asks you a question, answer it. This is how you make the connection and create a die-hard fan.

Socialize with Sponsors, and Get Creative

It's easy to take that check at the start of start of the year, dump it all into the race car, and ask for the money again next year. Again, refer to Ernie Saxton's columns that have given a bunch of great tips on how to thank your sponsors and how to keep them happy, many of those are very easy to do.

What can be even easier is using social media to keep your sponsors happy. There is a good chance your sponsor has a page similar to what you would use as a fan page. Make sure to follow those very closely, and promote them as well.

If they post a flier of an upcoming event or sale, share it as soon as possible. When your fans attend the event or capitalize on the offer and mention your name, the sponsor will be glad they chose to partner with you. Tag sponsors whenever possible in your statuses. You might see someone post that they've loaded the Smith's Bar/Jones' Tire and Auto/Mike's Graphics Chevy to head to the Speedway. By tagging those sponsors, they are sure to see you promoting them. If they get a spike in followers to their page shortly after the post, it's even better.

Oh yeah—almost forgot—support your sponsors! And make sure when



It's not just about Facebook. There are many who have made the migration to Twitter and Instagram. There are some programs that allow you to link accounts together so you can post to one and it copies to the other. Be careful with this, though. At times Twitter will capture that post as a link to Facebook. Don't alienate fans who choose to follow you on one social media versus the other.



Fans love updates. Pictures of race cars can get them excited for the upcoming season. This was posted to a personal page, so those who are friends with the driver can see it. Remember, if you do post to your personal page, post to your racing page too. Don't miss those fans.



Terry McCarl does a great job of interacting with his fans. On a snowy winter day he was able to connect with his fans and promote a sponsor. T-Mac can be smooth on and off the track.

ULTIMATE RACING

Natalie Decker
February 1

Natalie's Super Bowl Sunday message.



Like Comment Share

412 others like this.

25 shares

Natalie Decker is an up-and-coming racer who competes in the NASCAR Drive For Diversity program. Here is a pretty simple post from the offseason. Take a look at the number of likes and shares.

you do it, social media knows. Use the mobile app to check in if you head to your sponsor's place to watch the game. Sing the praises of the excellent service you received at your sponsor's autobody shop (remember to tag them in the status).

Short on content for your page? Pick a "sponsor of the week." Share their page and write a post about your history with them. No need to write a book, but let everyone know about that business and their partnership with you. Again, the sponsor is bound to see this. They'll enjoy that you took the extra time to promote them. Your fans might like to see that restaurant you've been advertising all year too.

A very creative example of cross promotion was done three seasons ago by Andy Monday, a Super Late Model racer at Wisconsin International Raceway. Monday had been partnered with a local dealership for several seasons, and they were looking to make a splash. For those of you who have chased the bigger fish, you'll know they have people who watch the dollars very close and want to see some return. Whether the return is in dollars or in exposure is up to them. Hopefully they will make it clear to you what they want so you know how to help them.

What came from the partnership was a "Design My Ride" contest, where young fans had the opportunity to create the paint scheme for his car. Entries were available at the dealership. This worked well on two fronts. First, anyone who was a fan of Monday wanting to enter the contest had to go to the dealership—with their parents, obviously. Those car sales people just need you to come through the door. Second, anyone who was at the dealership with kids had something to keep the youngsters entertained. They may not have known anything about short track racing before that, but now, there is a chance to have created a new fan.

All received entries were put on Facebook where fans voted by "liking" the picture of the design they wanted to see on the race car. Of course, proud parents and other family members shared the picture to try to generate

PHOTO SUBMITTED BY MONDAY MOTORSPORTS

A well-done contest by Andy Monday to work with his sponsors. This contest drove traffic into the dealership and gave existing customers an avenue to keep their children entertained. The contest went to Facebook where fans could vote for their favorite designs.

votes. Imagine all of the impressions that were made for the dealership, the supporting sponsor, and for Monday's race team during the contest. To this day Monday continues to be one of the most recognizable drivers by the fans at WIR, and there are plenty of his T-shirts being worn in the stands to prove it.

Put Your Car On Display

Last, but certainly not least, this is one that every driver should do at least once an offseason. Either through your sponsor, your track, or another event, there are many opportunities to get your car on display. Again, keep the sponsors happy. Put your car and team in position to interact with potential new fans and sponsors.

The timing of the events may not be the best, and you may be in the middle of tearing down or rebuilding. Know your audience for the circumstance. If you're going to a car-specific show, you may not want to bring your roller. Someone might want to look under the hood. However, if it's an event for kids, they just want to see the race car, get a picture taken, and sit inside. You can bring a roller there. If your sponsor is throwing a party and wants your car outside to draw people in from the highway, you might be able to get away with the roller there too. No matter the situation, keep the car looking immaculate inside and out. Also, be sure to have someone on hand ready to talk to whoever has questions. It could be the driver, car owner, or even your promoter. Don't let a potential fan or sponsor walk away.

Conclusion

There are many ways to win the offseason. You can win it by rebuilding your car, by finding new technology, or by increasing your fan or sponsor count. The most important thing to do is to stay active, and to let everyone know you are staying active. Keep in touch with your suppliers, your promoters, fellow racers, and reach out to your fans. Even if winning the offseason doesn't translate into trips to Victory Lane, it'll make those long winter months feel shorter and help you gain momentum for your race team. 



Two winners were chosen in the contest. Thanks to the ease of vinyl wraps Monday went with one design on the left and one on the right. The team put their car on display shortly before the season after the designs had been put onto the car, again driving more traffic to the dealership.



This is called "The Big Event for Little Kids." Wisconsin racer Kyle Calmes gained support and a group of fans from attending the event. Shows like this don't necessarily need a finished race car, just something to get the kids excited about the sport.

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Fluidampr Performance Dampers give increased performance. Elastomer harmonic balancers use a tuned rubber strip bonded between a hub and outer inertia ring. At a predetermined peak vibration the balancer throws the inertia ring to counteract the twisting and rebounding of the crankshaft. Rubber does not dissipate heat well and the risk is that it will dry, crack, and bulge. As the rubber loses its integrity

Obtaining perfect balance

is important to your engine's performance. The harmonic balancer reduces torsional vibration of the crankshaft, which is the motion naturally generated during each power stroke. The benefits of a good harmonic balancer include greater valvetrain and timing efficiency and reduction of wear in critical engine components, such as bearings, the oil pump, and the crankshaft.

and elasticity, its ability to protect the engine diminishes.

The engineers at Vibratech TVD, the parent company of Fluidampr and inventor of the viscous torsional vibration damper, have perfected the use of silicone for over 65 years. It could be assumed that the fluid in a Fluidampr may be like motor oil or hydraulic shock fluid, as those are commonly used in other fluid dampening devices. This leads some to believe that Fluidampr silicone turns to a gel over time. Because Fluidampr is dealing with torsional vibration from internal combustion, the silicone used is 45,000 times more viscous than 30W motor oil.

By shearing a free-rotating inertia ring back and forth through a highly viscous silicone fluid, viscous dampers remove vibration energy. This action sees vibration energy converted to heat, which can easily be dissipated through the sealed inertia ring housing. The free rotating inertia ring adds the extra advantage of controlling vibrations and providing the necessary protection whenever an engine modification is made.

Fluidampr Performance Dampers are composed of a free rotating inertia ring inside a laser sealed outer housing within tight tolerance of each other. The components are computer balanced during manufacturing to exceed OEM standards. There is an area between the inertia ring and the outer housing that is referred to as the shear gap, which is pressure injected with viscous silicone. Silicone is used because it maintains stability across an extreme temperature range with incredible heat dissipation capability.

Superior engine protection, broad range performance, and durability are why a viscous damper is used as original equipment in high-quality sports cars and diesel trucks, such as the V-10 equipped Audi R8 and Lamborghini Gallardo, and the Ram 6.7L Cummins. The Fluidampr Performance Damper can be a part of the winning formula in your racer, and keep your engine performing how it should all season long. □

SOURCES

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MILLER INTRODUCES UPGRADES TO DYNASTY AND MAXSTAR

COMPILED BY MATT PANURE



Recently updated, Miller Electric Manufacturing Company's Dynasty 210 and Maxstar 210 deliver up to 210 amps of output power in an easy-to-use, versatile, portable package with some of the best TIG and stick performance on the market. This package also allows for upgrade flexibility.

The upgraded Dynasty 210 has a power source that is AC/DC TIG/stick capable. It will weld up to $\frac{1}{4}$ -inch steel and aluminum in a single pass. The Maxstar, which is DC TIG/stick capable, welds up to $\frac{1}{4}$ -inch steel in a single pass. Each standalone power source weighs no more than 50 pounds. They also feature dual-carry handles and a carrying strap to increase ease in portability.

The upgraded Dynasty and Maxstar are designed with the welder in mind. The welders were upgraded to combat challenges welding operators face every day. Those operators can expect flexible performance, which they can count on to complete a wide variety of jobs with outstanding weld quality.

All models now come standard with an easy-to-reach standby power switch on the front of the unit. This is capable of placing the machine into a sleep mode when not in use. Each model also features Miller-exclusive Pro-Set technology, which provides preset welding parameters to enhance ease-of-use and eliminate guesswork.

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are provided in the base models of the Dynasty and Maxstar. The Maxstar 210 STR model also features digital meters and dual welding memories to improve the speed and consistency of process setup. The Dynasty DX offers full A/C and features an opportunity to improve performance on aluminum with advanced waveforms, along with wide ranges for balance and frequency.

An integrated 120V, dedicated-use receptacle design to power the Coolmate 1.3 is standard on the Dynasty water-cooled packages. To reduce the chance of torch failure, a power switch on the machine activates the receptacle. The new Cooler-On-Demand operates the cooling system only when needed. This reduces use of energy, noise, and airborne contaminants, which are pulled through the cooler.

Adding to the versatility and portability is the Auto-Line power management technology that provides added convenience by allowing the welder to connect to almost any type of available input power while producing a steady, high-quality arc. A steady welding output for consistent, high-quality welds can now be achieved by operators in more places.

Another feature designed into the new models for fast and easy upgrade flexibility is a front-panel memory card data port, which allows for the download of software updates from millerwelds.com/tigsoftware, as well as the purchase of product feature expansions. With offers to access to the most up-to-date software, the memory card data port allows maximization of owner's budgets while allowing them to gain the best performance over a longer period of time.

Just as their predecessors the new Dynasty and Maxstar models are fully compatible with Miller wireless remote control solutions, allowing operators to work safer and faster from up to 300 feet away from the power source. This eliminates cord tangles and failures, which help increase savings in time and money while also allowing precise operator control and weld quality. □

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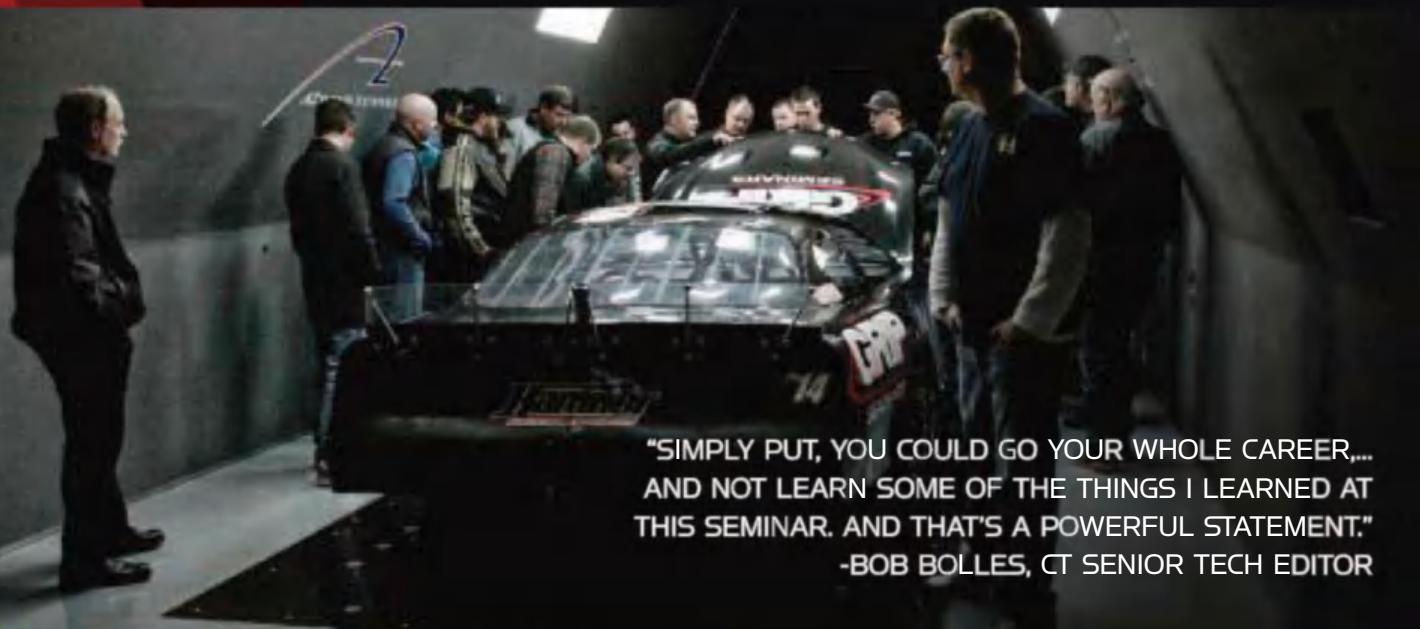
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SHOW ME THE MONEY

BY ERNIE SAXTON

KEEP THESE KEY COMPONENTS IN MIND

This subject has been covered before and will be covered again in the future, and again after that. It is important to bring this up every so often so that NEW readers/

racers can gain some knowledge about the importance of what should be in a good sponsorship proposal.

Now that you have made contact with the marketing director at a company you would like to have as a sponsor, it is now time to put together a good strong proposal based on the information you have gained from them. Keep in mind that I said "made contact with." Don't send a proposal unless you have first talked with the marketing director or the contact you have made at the company. The same holds true for the racer seeking sponsorship from a local business. No matter what the amount of money is that you are asking for the proposal should be based on some of the same key points.

Many of the proposals I see these days are far too long. Business people just don't have the time to spend on proposals that take them back to the grammar school days of the racer racing his big wheel. Keep it concise but include the important information that will help the decision maker to make that decision.

First off, there should be a cover letter addressed to the individual that outlines key points in the proposal. Include contact information. Tell him or her that you will be following up with a telephone call in a few days. However make sure they are aware that you are available to answer questions and discuss the proposal. Make sure you give them contact information where you can be contacted in a timely manner. And be sure to return the telephone call or email quickly. Unfortunately, I have often waited days to get a response from clients. That should not happen. With all the competition for sponsorship, those who act promptly are the ones who are often the most successful.

Keep in mind when seeking sponsorship, serious financial support, you are not just going up against others in the sport but you are going up against other sports, entertainment venues, educational facilities, and more. And that is why a good proposal is so important.

It is important to have a strong cover letter that

outlines what is included in the proposal. The cover letter should be on your official letterhead. If you don't have letterhead then visit Staples or Office Depot and they can help you design one that will not cost a small fortune.

The proposal should have a title page that tells the recipient that this sponsorship proposal is for the name of the company. It is an exclusive proposal. And on that title page should be your contact information again.

There should be a table of contents so that reader of the proposal knows exactly where all the pertinent information can be found.

Include a page of facts and figures on the driver and owner. Include a GOOD head shot of the driver. The potential sponsor wants to make sure you do not have a third eye in the middle of your forehead.

A brief description of the type of racing you are involved in should be included. A good photo of the race car with the team and the hauler (a good looking hauler) would fit well here.

Another photo that adds a lot of impact is the race car in action in front of a packed grandstand of fans. Do not use a photo that shows empty grandstands.

Show a complete schedule that lists dates, facility name, location, and, if possible, the name of the sponsor of the event being offered on each date. That shows your potential sponsor how much support there is from other sponsors.

Often forgotten are the demographics. Who attends your events? Ages, married or single, family members, income, home owner or not, and the list goes on. This is important. You don't want to be seeking sponsorship from a Mercedes-Benz dealer if the people attending your events are making \$30,000 a year. That is not the audience they will want to be reaching.

What are the marketing objectives? List what the sponsorship of your team can give the potential sponsor in the way of marketing ... brand name awareness, media exposure, generate sales leads, create a winning image, the list goes on.

There should be a list of things that your team is willing to do such as name/logo on the race car and hauler. I cannot emphasize the importance of the hauler enough. In many cases the logo on the hauler could be more important than the logo on the race car. Think about how many people see the hauler as it travels to races, personal appearance, and other events.

The sponsorship program benefits for the sponsor is impressive, especially if you can add in benefits that you are able to include as a result of the conversation that you have had with the potential sponsor. ☐

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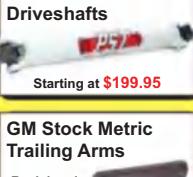
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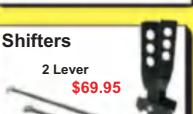
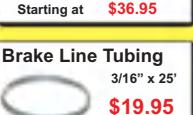
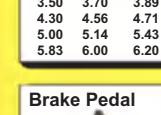
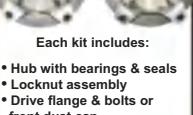
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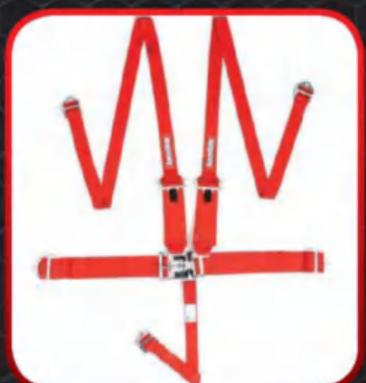


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SERPENTINE
Drive 1020-S
works with any fan



Photo by: Braden Rouse



Photo by: Todd Boyd



2004-RA
Rear Mount
Oil Pump Drive



Photo by: Braden Rouse

DIRT LATE MODEL BELT DRIVE SYSTEMS

Serpentine Water Pump & Power Steering Drive with Radius Tooth HTD Alternator, Kit# **1441-AR-CE**.

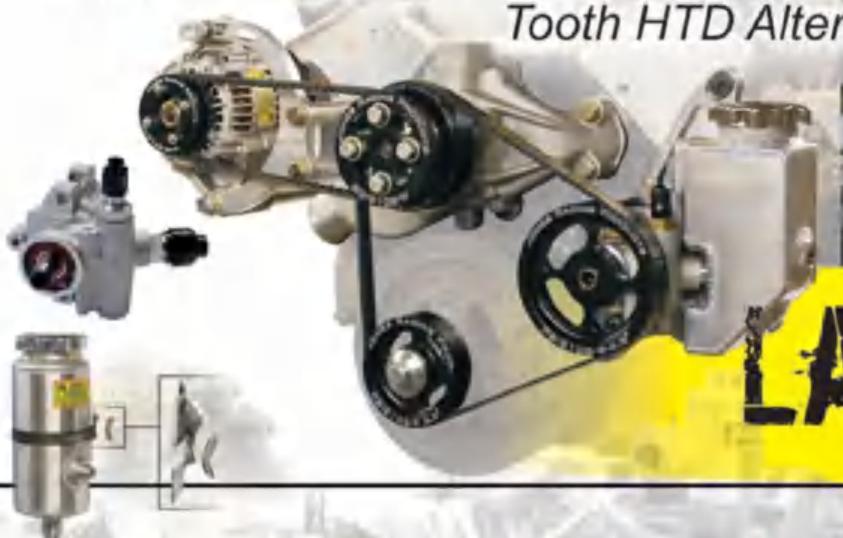


Photo by: Renee Tidaback

ASPHALT LATE MODEL BELT DRIVE SYSTEMS

SBC & BBC Dirt Mod
Complete Belt Drive
1055-S (BBC)
1056-S (SBC)

26 Feature Wins, Syracuse Dirt Winner
Stewart Friesen



Photo by: Rick Sweeten

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Advanced Positive-Engagement Positive Torque Belt Drive with Lightweight Billet Aluminum Pulleys

High Capacity Fabricated Aluminum Power Steering Reverb

Lightweight High Output Mini One-Wire Alternator 50 amps at Idle Peak 70+.

Track Champion 5 Feature Wins Mike Leaty

1565-AR-CF

SBF Circle Track Complete Front Drive
Kit #

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2041-RA

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Kit #

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Lightweight High Output Mini One-Wire Alternator 50 amps at Idle Peak 70+.

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& for SB Chrysler use Kit# 2075-RA

WP-9104-17-H3

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4 Feature Wins CJ Jones

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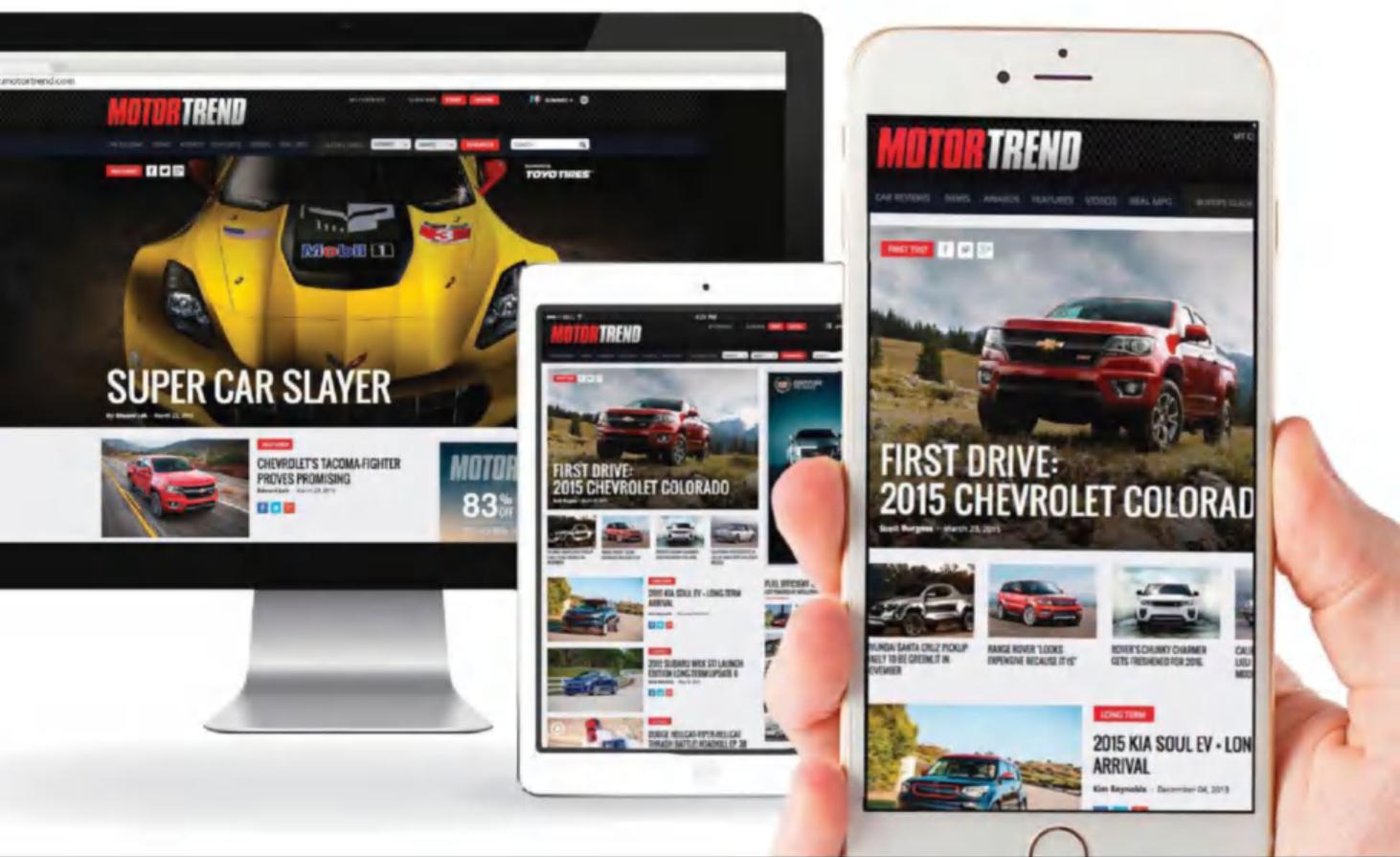
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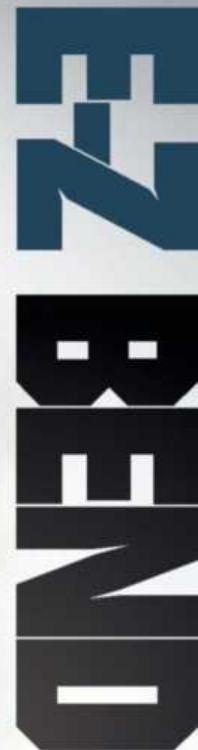
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